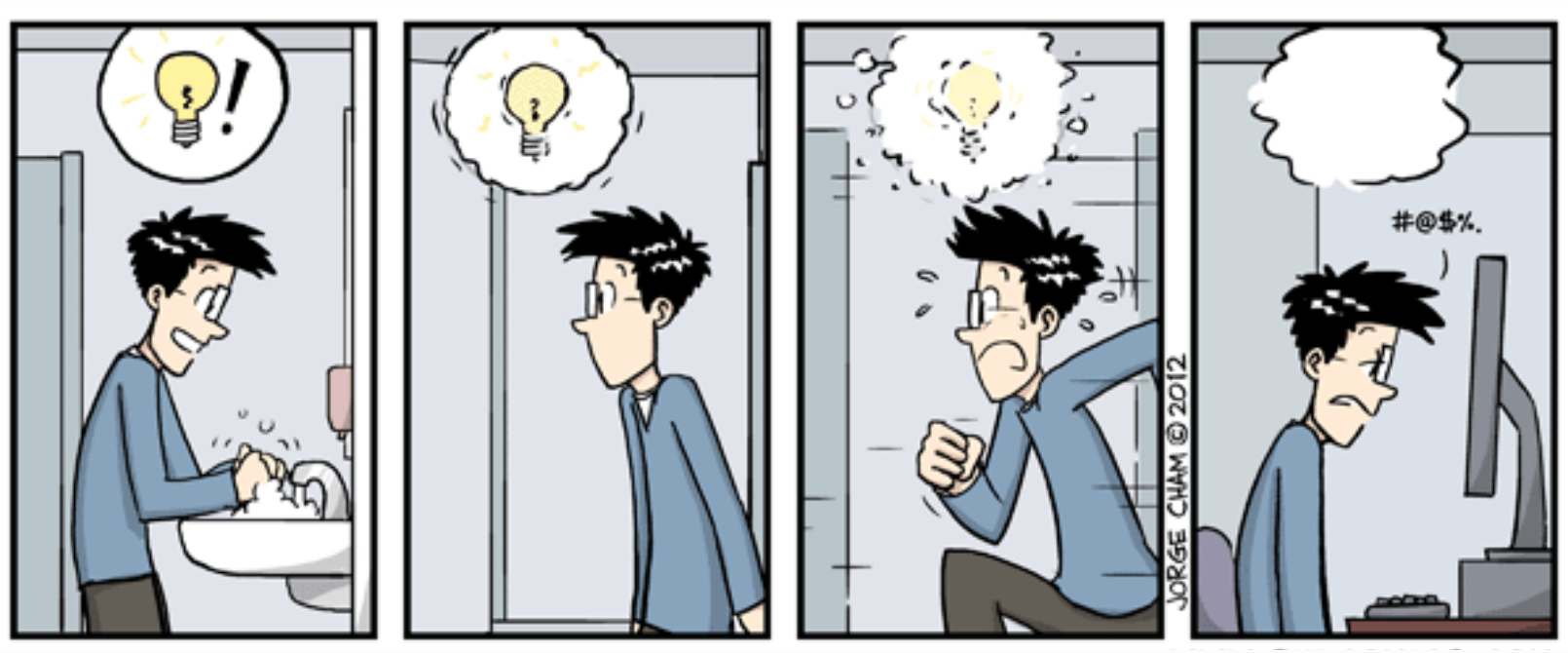
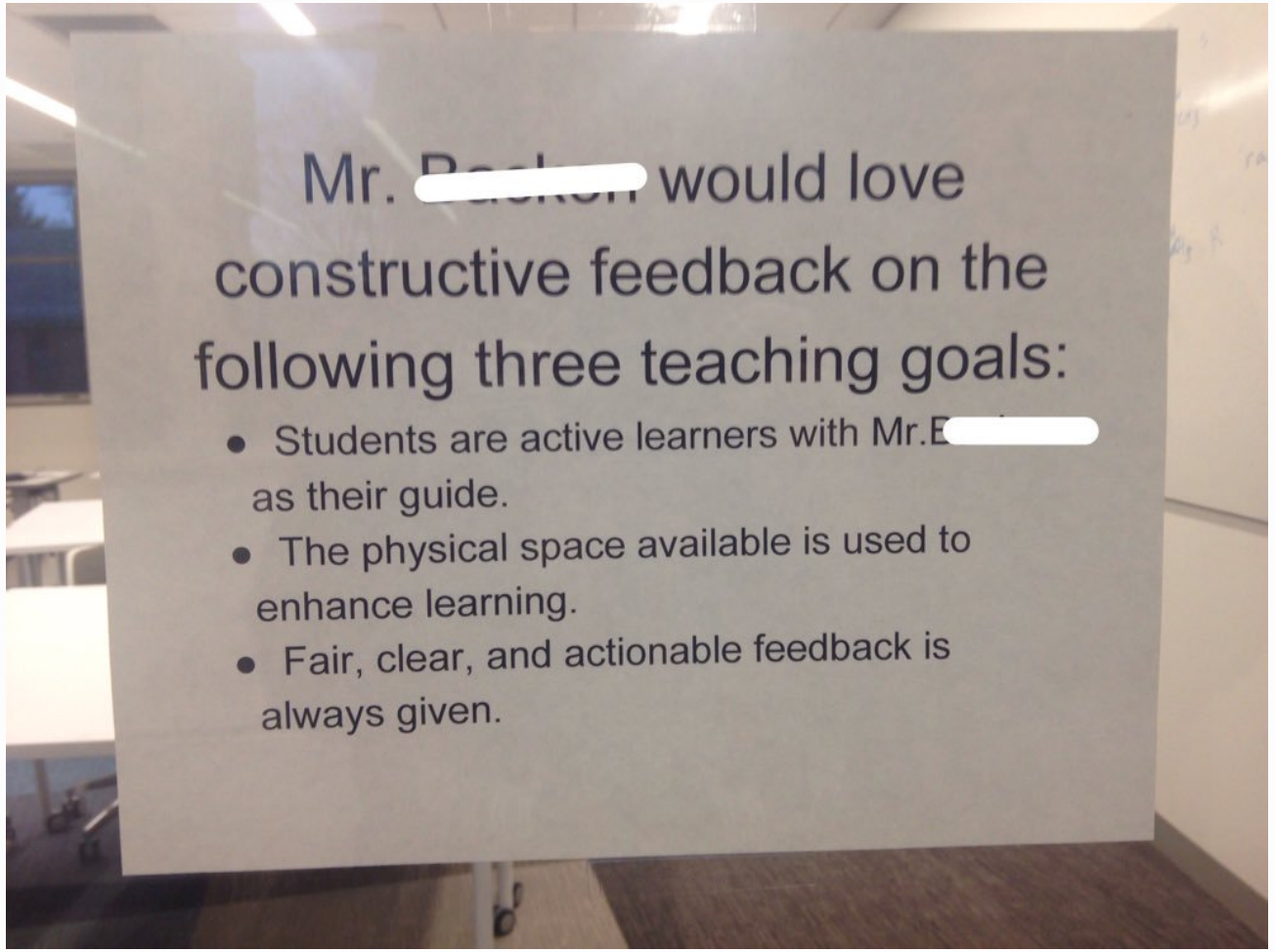
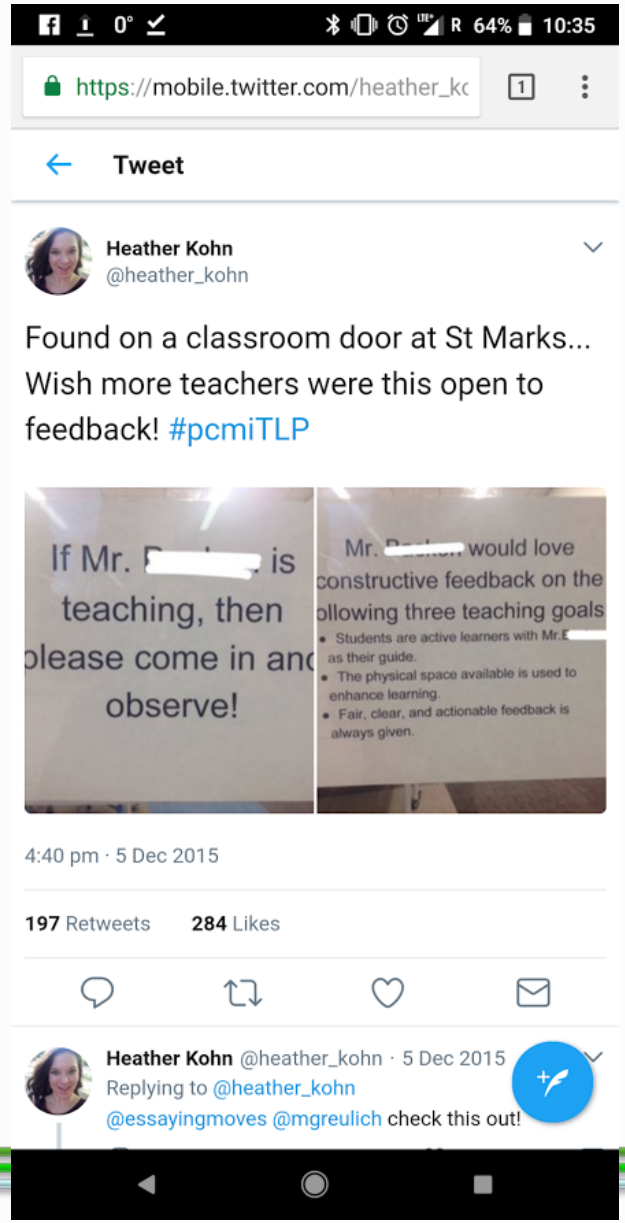
Reflecting on Practice: Implementing Worthwhile Tasks







http://robertkaplinsky.com/observeme/

John Dewey Agreements

Listen to anybody that's talking.

Try your best.

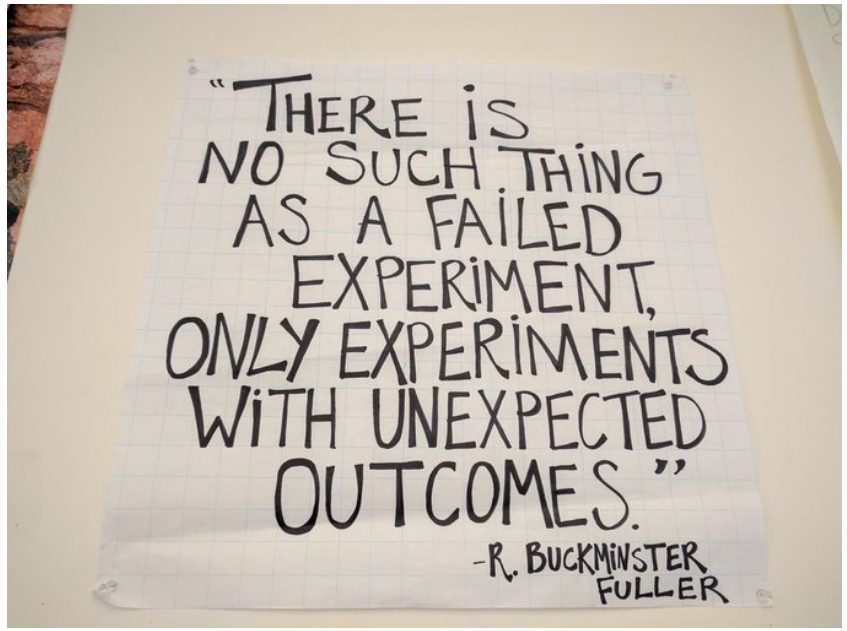
Trust yourself and take risks!

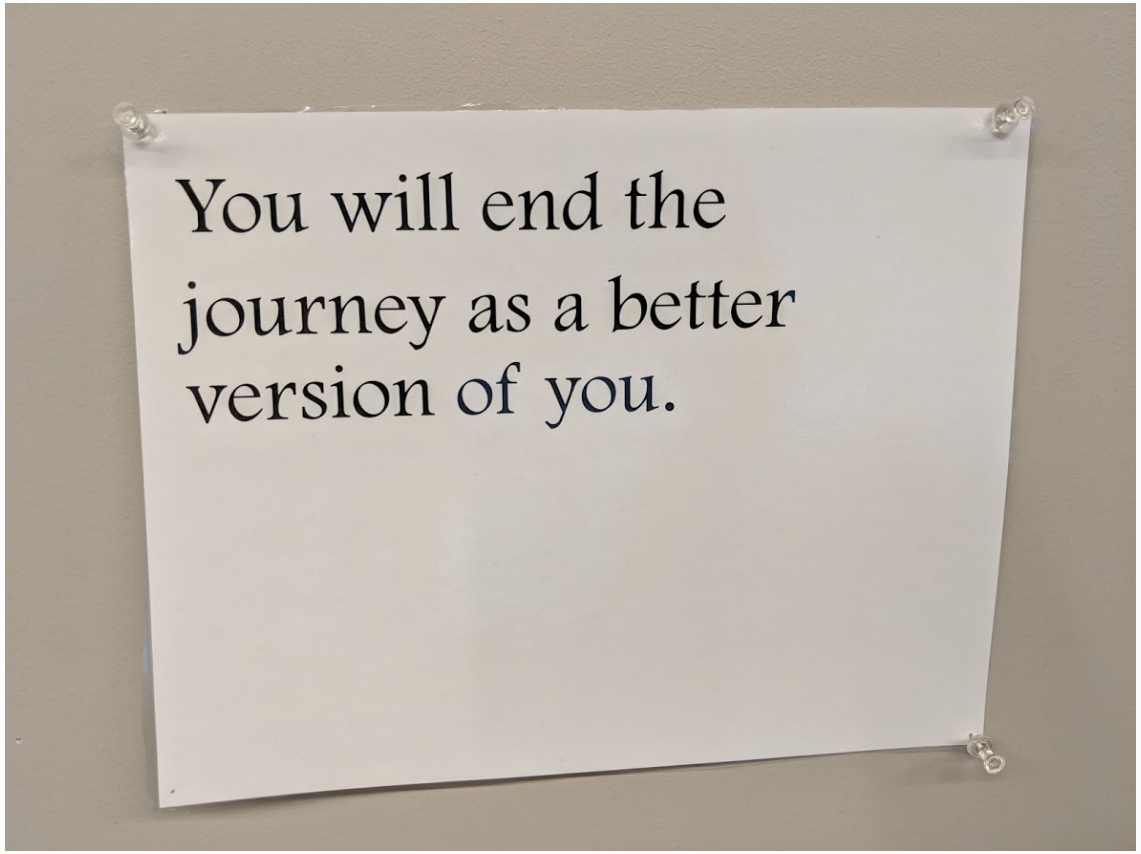
Encourage other ideas.

Treat people how you want to be treated.

Don't put anybody down.

(Do not make fun of others or talk about people behind their backs. (If you think it might hurt their feelings, don't do it.)




You will end the
journey as a better
version of you.


BE KIND
WORK HARD
GET SMART

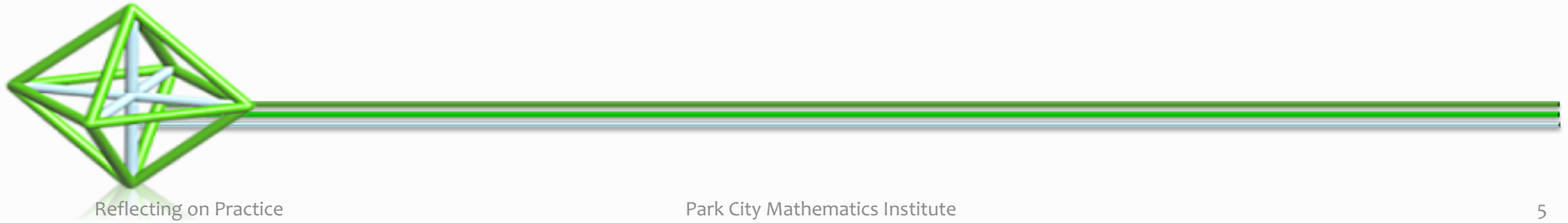
Session 1: What makes a worthwhile mathematical task?

- Opportunity for discussion
- Cognitive demand

Session 2: How do we adapt tasks to make them more meaningful?

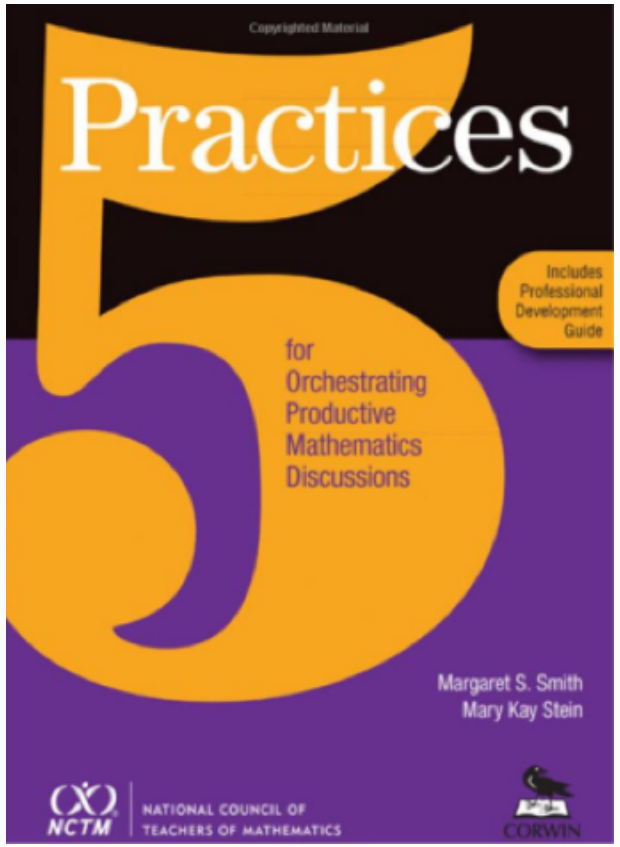
- Open-ended tasks
- Dekker & Querrelle – give right/wrong solutions & ask for classification
- Jeopardy – give solution and students pose task
- Grouping mathematical ideas

Session 3: Implementation



The 5 Practices

- Anticipate
- Monitor
- Select
- Sequence
- Connect



Smith & Stein, 2011

Becky & Genevieve's activity

http://projects.ias.edu/pcmi/hstp/sum2016/wg/pldev/lowhigh/

- What answers do you expect to see? **(Anticipating)**
- What are students doing? **(Monitoring)**
- What responses are worth discussing? **(Selecting)**
- How will you sequence responses? **(Sequencing)**
- What is the mathematical punchline? **(Connecting)**

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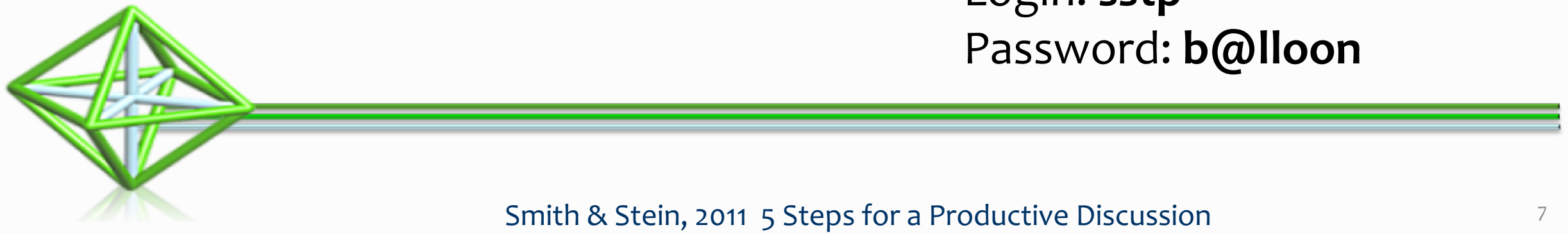

Park City Mathematics Institute
TLP Summer 2016 Working Group
Professional Learning Development
Low Floor/High Ceiling

Low Floor/High Ceiling
PD around implementing math task that are low floor and high ceiling especially at the middle school level in order to provide access to a diverse group of abilities/skill levels or PD on the book "5 Practices for Orchestrating Productive Math Discussion."

Selecting and Sequencing Student Work
This PD is on how to facilitate low-floor high-ceiling tasks to optimize productive mathematical discussions in order for students to learn from each other and move forward in their thinking. We will focus on the practice of selecting and sequencing student work to guide classroom discussion.

Becky Bob-Waksberg, Genevieve Esmende, Lisa Soltani, and Irene Espiritu

Selecting and Sequencing Student Work for Facilitating Productive Mathematical Discourse

Grade Level: Middle School
Subject: Pedagogy
Authors: Becky Bob-Waksberg, Genevieve Esmende

Many teachers have started using low-floor high-ceiling tasks in their classroom, but to facilitate productive mathematical classroom conversation consistently can be difficult. Based on 5 Practices for Orchestrating Productive Mathematical Discussions by Stein and Smith, this session will focus on the practices of selecting and sequencing student work, which help students learn from each other and move forward in their thinking. Participants will experience a low-floor high-ceiling task and see how we model the process of selecting and sequencing. Participants will also analyze student work and experience the process of selecting and sequencing the work that will be presented to the class.

download **zipped folder** LowhighWest.zip [*generic login required*]

Launch Pad: Introductory Tasks for CC Algebra 2

Grade Level: High school Algebra 2 teachers or those interested in CC Algebra 2
Subject: CC teaching methods for Algebra 2
Authors: Hannah McDowell, Stephen Ishii, Mary Vélez

Tired of never making it to the fun application problems at the end of the unit? Looking for a new way to start teaching a unit? Wondering how to implement more mathematical practices? We can help! You will participate in a model lesson to introduce trigonometry in a CC Algebra 2 classroom that helps you get to the heart of accessing prior knowledge and using it as the basis for new learning. At the same time you will experience the mathematical practices of perseverance, abstract reasoning, constructing and critiquing arguments, and modeling, just like your students will. Prepare to work your math muscles and take away tasks on polynomials, quadratics, probability, trigonometry, and exponentials for your classroom.

download **zipped folder** Launch.zip [*generic login required*]

Rubric to Assess Standards for Mathematical Practice

Grade Level: Elementary school and High School Educators
Subject: Standards for Mathematical Practice
Authors: Danilsa Fernandez, Elizabeth Houwen, Elissa Kaufman

The Standards for Mathematical Practice are outlined in the Common Core State Standards as a list of eight areas of expertise that teachers should develop in their students in conjunction with mathematics content standards. Although a variety of resources have been made available to educators to help them implement these practices, there are limited assessment tools with a precise focus on such practices.
The purpose of this project was to develop a rubric that will assist educators to measure student skill levels in each of the eight categories. The rubric is intended to

Becky & Genevieve's activity

http://projects.ias.edu/pcmi/hstp/sum2016/wg/pldev/lowhigh/

- What answers do you expect to see? **(Anticipating)**
- What are students doing? **(Monitoring)**
- What responses are worth discussing? **(Selecting)**
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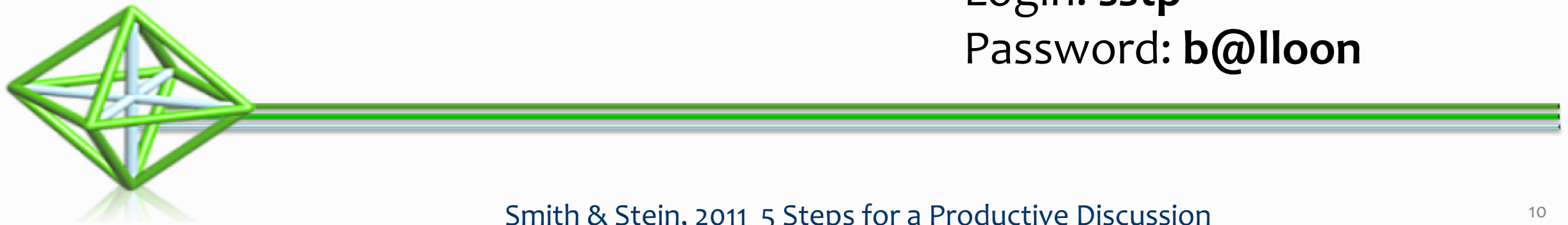


Graphing Linear Equations (US TIMSS video)

Using a pencil and the large piece of graph paper, graph the following linear equations:

1) $y = \frac{2}{3}x + 8$
2) $y = \frac{3}{5}x - 10$
3) $y = 3x + 7$
4) $y = \frac{1}{4}x - 4$
5) $y = x - 5$

After these five equations are graphed, check with me before proceeding.

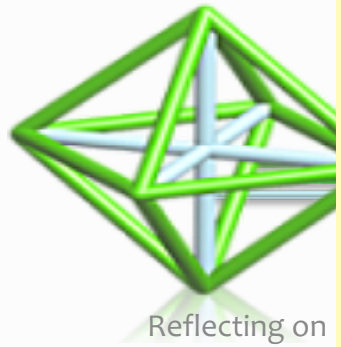
Now, graph the next five equations

6) $y = -\frac{5}{3}x + 8$
7) $y = -4x - 1$
8) $y = -\frac{1}{3}x + 12$
9) $y = -\frac{3}{2}x + 14$
10) $y = -x + 3$

Answer the questions on the next page

Page 2

1) What is similar about linear equations 1 through 5?
2) What is similar about linear equations 6 through 10?
3) Which line goes up the fastest?
4) Which line goes down the fastest?
5) What do you notice about the intersection between equation 1 and 9?
6) What do you notice about the intersection between equation 2 and 6?
7) What do you notice about the intersection between equation 3 and 8?
8) What do you notice about the intersection between equation 4 and 7?
9) What do you notice about the intersection between equation 5 and 10?
10) Are any of the lines parallel to one another? If not, why do you think so?



Graphing Linear Equations

As you watch, think about:

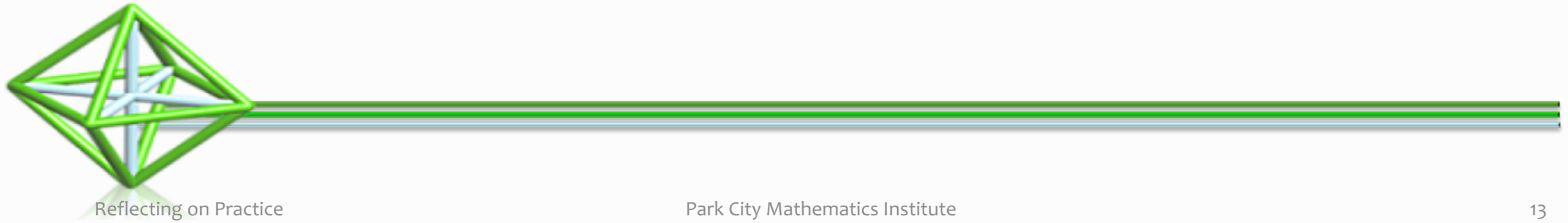
What things had the teacher done to prepare for the lesson?

What evidence do you see that students are ready or not ready to do the task?

(US 8th grade TIMSS video)

We watched the video below from 1:46-5:44

http://timssvideo.com/58



Graphing linear equations

- "What things had the teacher done to prepare for the lesson?"

- "Were the students ready to do the task? What is your evidence?"

(http://timssvideo.com/58 US 8th grade TIMSS video)

Using a pencil and the large piece of graph paper, graph the following linear equations:

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TIMMS Graphing Linear Equations

- What do students need to know to do this task?
- Was there evidence they lacked one or more of these pieces of knowledge?
- What questions or other checks could have elicit this evidence?

http://timssvideo.com/58

Using a pencil and the large piece of graph paper, graph the following linear equations:

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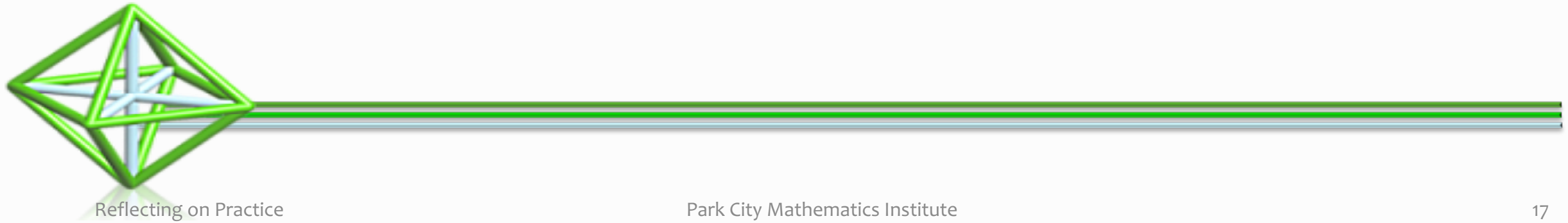
It has been one month since Ichiro's mother has entered the hospital. He has decided to say a prayer with his smaller brother at a local temple every morning so that she will be well soon.

There are 18 10-yen coins in Ichiro's wallet and just 22 five-yen coins in his smaller brother's wallet. They have decided every time to take one coin from each of them, and put them in the offertory box, and continue their prayers until either wallet becomes empty. One day after they were done with their prayers, when they looked into each other's wallets, the smaller brother's amount of money was greater than Ichiro’s.

How many days has it been since they started praying?

Ichiro's Mother

What planning/anticipating do you need to do before you would give this to your students?



Ichiro's Mother

As you watch, think about the question:

What do you think the teacher planned for in preparing the lesson?

Japanese 8th grade video

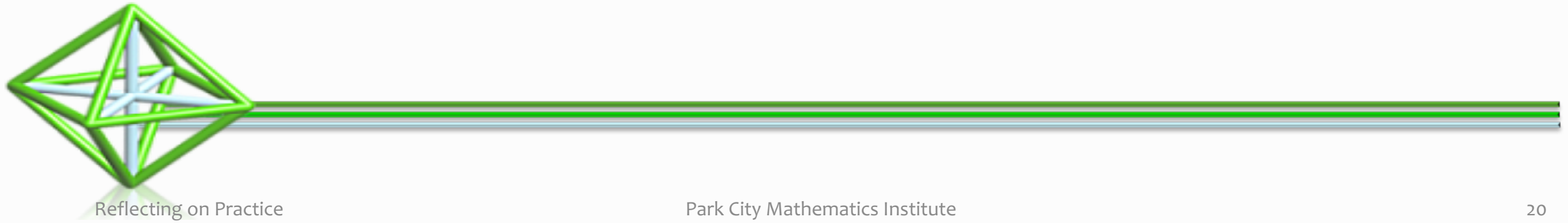
Ichiro's Mother

What to you think the teacher planned for in preparing the lesson?

Japanese 8th grade video

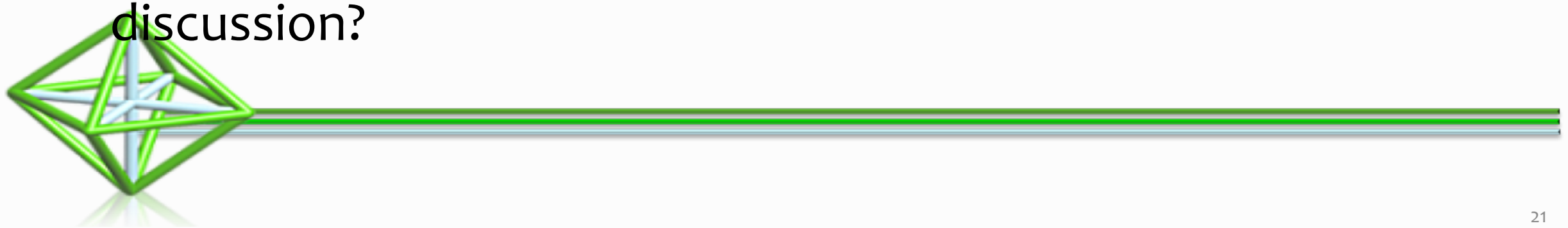
Cal's favorite Japanese word

- Blake Petersen from BYU
  - Doing the Sequencing/Connecting from Smith/Stein
- **Kikan-Shido:** "Between Desks Instruction"
- A term from Japanese lesson-study, describing the teacher's walking around the room, predominantly monitoring or guiding student activity – the teacher makes *intentional* choices to speak or interact with students.

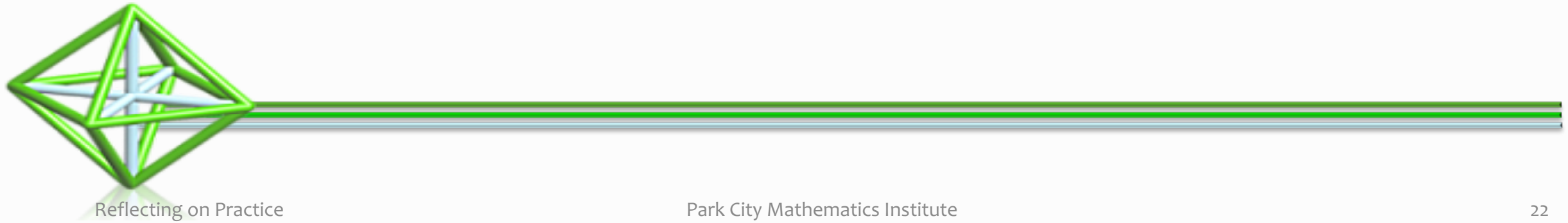


Participation quiz (PCMI, 2011)

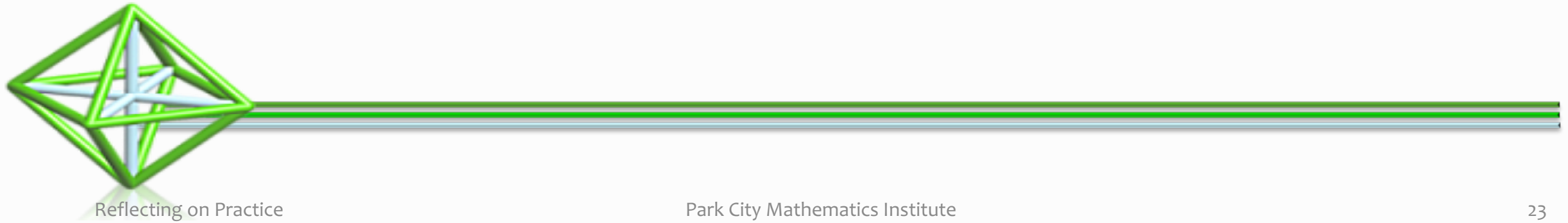
- High school algebra class working on factoring. They are being graded on how well they work together on the task not on right answers.
- You have expectations about the way discussions should happen in your classroom. Do your students know what they are?
- As you watch, what norms are being established to encourage discussion?



- What explicit norms does the teacher set for student discussion?
- What level math talk is going on in the class
- What things does the teacher do to promote math talk?



This video is not available for public display outside of PCMI TLP.

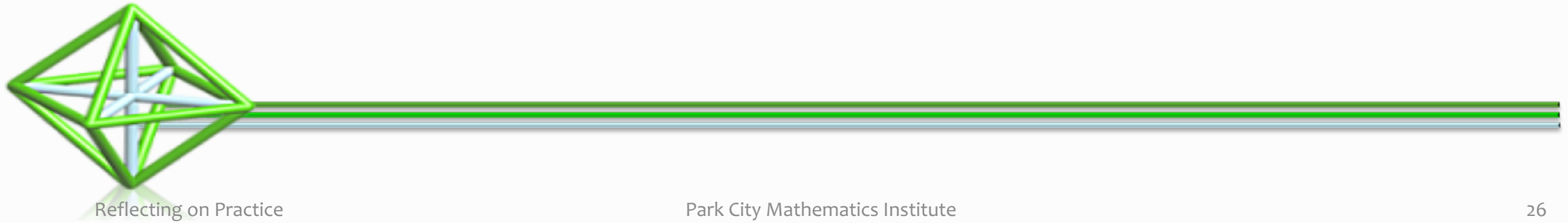


Norms for students working together

- Take turns
- Listen to others ideas
- Disagree with ideas not people
- Be respectful
- Helping is not the same as giving answers
- Confusion is part of learning
- Say your “becauses”
- “I can’t do that yet?”

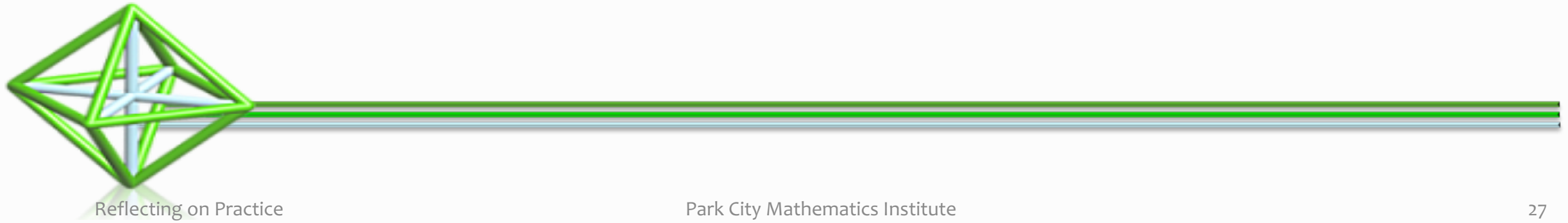
Horn, 2012

Successful implementation of worthwhile tasks does not just happen by chance



Getting ready

What things do you need to think about when planning to implement a task in your classroom ?



References

- Graphing Linear Equations Video: US1
  http://timssvideo.com/videos/mathematics/United%20States
- Solving Inequalities Video: JP3 http://timssvideo.com/49