

Conferring in the Elementary Mathematics Classroom: Making Interactions Powerful

JEN MUNSON

National Council of the Teachers of Mathematics
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San Francisco

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Conferring: What are you working on?



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3

Then what?

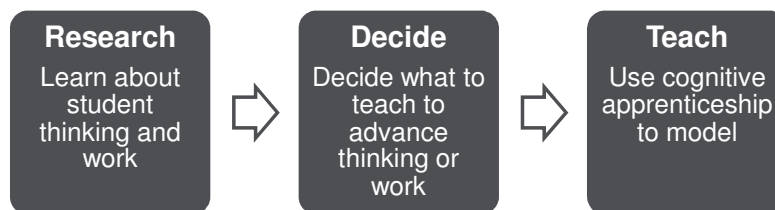


- FOLLOW-UP QUESTIONS MATTER (FRANKE ET AL., 2009)
- DECIDING HOW TO RESPOND IS CHALLENGING (JACOBS, LAMB, PHILIPP, & SCHAPPELLE, 2011)

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Literacy Conference: A Structure for Responsive Teaching

CALKINS (1986, 2000) FRAMED THE WRITING AND READING CONFERENCE AS:



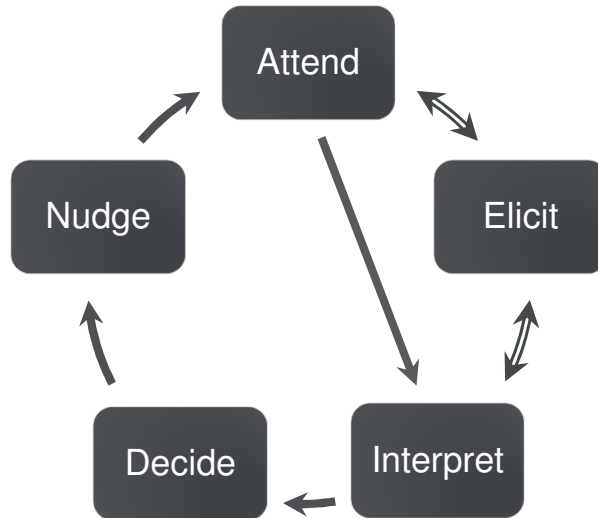
HOW COULD THIS STRUCTURE BE ADAPTED FOR USE IN MATH?

WE NEED TO CONSIDER **TWO DISCIPLINARY DIFFERENCES**:

- In math we don't want to model to teach
- Students are often collaborating

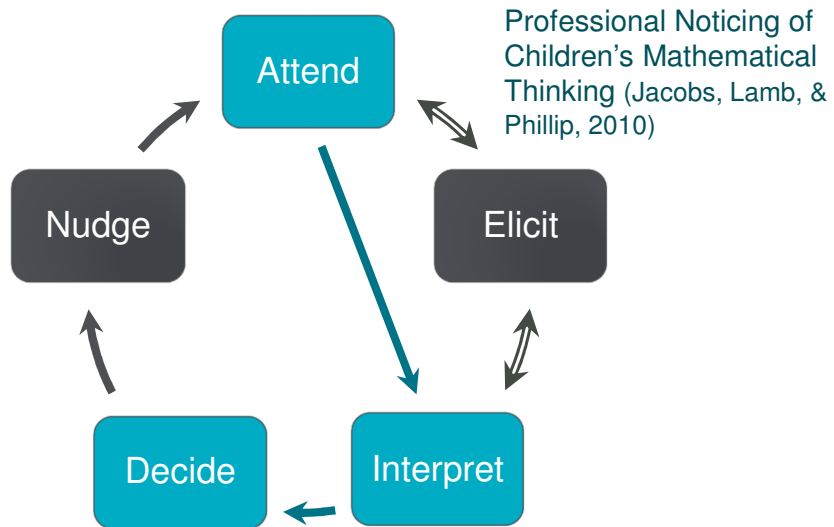
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Framework for the Mathematics Conference



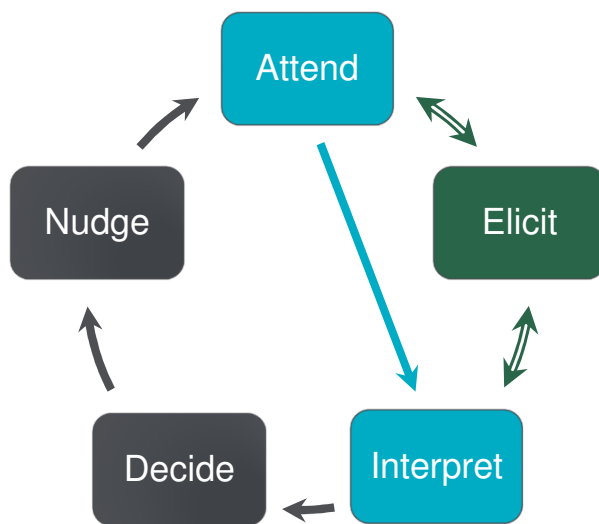
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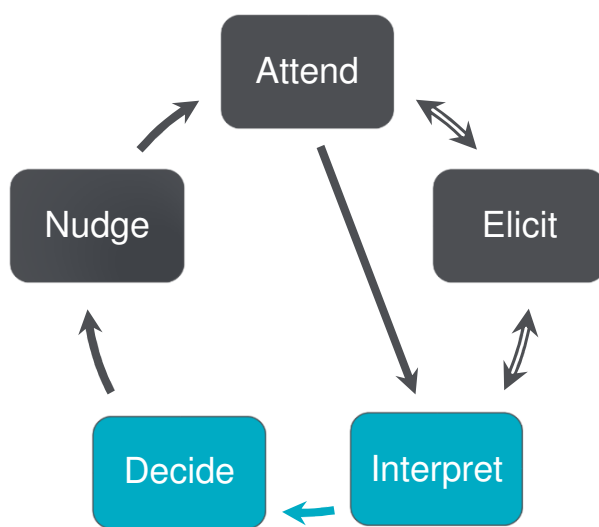
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Framework for the Mathematics Conference



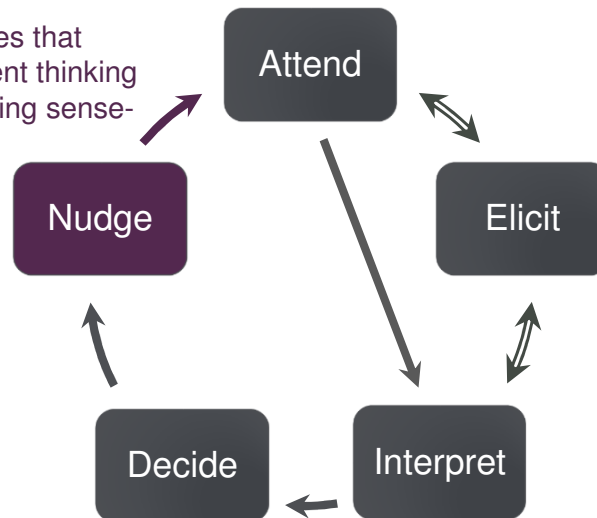
Eliciting student thinking (NCTM 2014) as the engine that drives noticing

Framework for the Mathematics Conference



Framework for the Mathematics Conference

Then what:
Teaching moves that advance student thinking while maintaining sense-making



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The Study

PARTICIPANTS: TWO 4TH GRADE TEACHERS AND THEIR STUDENTS

- Participated in professional development on conferring
- Teaching by launching a mathematical task, providing collaborative work time, and closing with a discussion

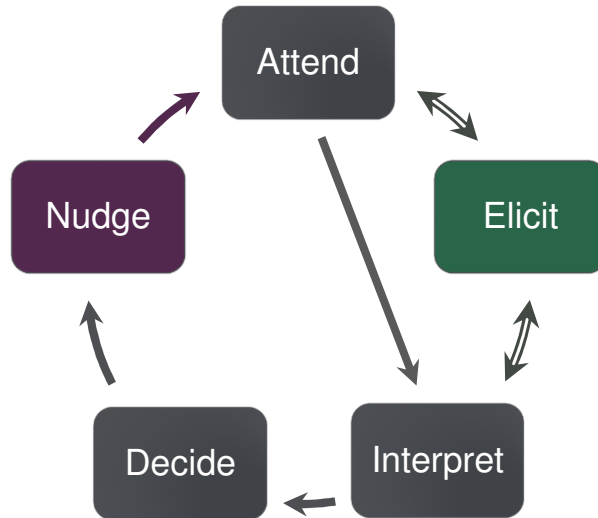
DATA: NINE LESSONS TAUGHT DURING THE SAME WEEK, AUDIO RECORDED.

ANALYSIS: IDENTIFIED AND TRANSCRIBED ALL CONFERENCES

- Coded talk episodes by purpose (e.g., eliciting, probing, nudging)
- Analyzed structures
- Classified the nudges

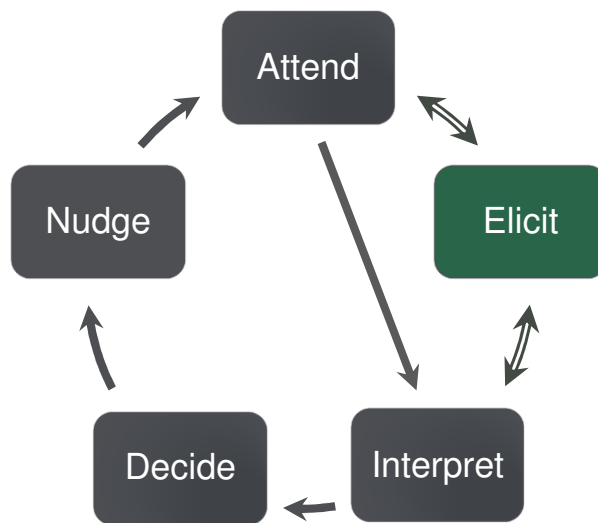
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When Observing a Math Conference, We Can Hear:



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When Observing a Math Conference, We Can Hear:



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The Task

DEVELOP A STRATEGY FOR MOVING BETWEEN HEIGHT IN FEET & INCHES AND HEIGHT IN INCHES ONLY.

Students were given several height, posted accurately on the wall, each representing a real person. Two of those heights were:

85 INCHES

6 FEET 5 INCHES

Eliciting Only: The Approximated Conference

MRS. HOBBS: WHAT'D Y'ALL DO OVER HERE?

ELENA: WE DID THE MULTIPLES [OF 12]—

CHRIS: - [WE DID 12] A & E

ELENA: WE DID THE MULTIPLES OF 12 AND THEN CIR-, AND THEN FOR 85 INCHES WE GOT THE CLOSEST IS [84].

CHRIS: [84]

ELENA: AND THEN, IT WAS 7, SO IT'S 7 FOOT OUT OF, [BECAUSE,] 'CAUSE THE 12 INCHES IS ONE FOOT —

CHRIS [BECAUSE THE 12 -]

MRS. HOBBS: MMHM.

CHRIS: SO WE DID THE MULTIPLES OF 12 AND THEN WE, THAT'S 7 —

MRS. HOBBS: MMHM.

CHRIS: SO THEN SEVEN, AND THEN WE ADDED JUST $84 + 1$ EQUALS 85.

MRS. HOBBS: MMHM.

CHRIS: SO WE JUST ADD 1 INCH, SO IT'S, IT'S 7 FOOT AND 1 INCH.

MRS. HOBBS: GOOD JOB. THAT'S REALLY GOOD. SO YOU DID YOURS IN MULTIPLES OF 12.

CHRIS: MMHM.

MRS. HOBBS: OKAY.

ELENA: JUST LIKE WE DID THE SAME THING FOR THIS ONE. AND WE DID, AND WE JUST ADDED THE FIVE INCHES TO THAT, AND ADDED, AND HAD 72 PLUS 5, 77 INCHES.

MRS. HOBBS: GOOD JOB. REALLY GOOD JOB.

Eliciting

The Math Conference: Eliciting and Nudging

MRS. HOBBS: OKAY. SO WHAT KIND OF IDEAS HAVE Y'ALL COME UP WITH?

Eliciting

JACKIE: FIRST, FIRST 'CAUSE THERE'S 12 INCHES IN EACH FOOT, I WOULD DO, LIKE, 6 FEET TIMES 12 INCHES IN EACH FOOT WOULD GIVE YOU 72 INCHES. THEN YOU ADD THE LEFTOVER 5 INCHES AND GET 77 INCHES TOTAL.

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MRS. HOBBS: OKAY. SO WHAT MADE YOU THINK THAT? HOW DID YOU KNOW TO DO THAT?

Probing

JACKIE: I, I WAS THINKING OF EQUAL GROUPS OF, LIKE, 12 IN-, 12, EQUAL GROUPS OF 12.

MRS. HOBBS: OKAY... AND HOW COME YOU JUST ADDED THAT, UH, 5 IN THERE... - AT THE END?

JACKIE: -BECAUSE-
- 6 FEET, 5 INCHES. 5 INCHES IS NOT A FOOT, SO YOU HAVE TO ADD THAT IN. IT'S LEFT OVER FROM THE 6 FEET.

What is your interpretation of student thinking?

What do they understand?
Not yet understand?
Misunderstand?

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MRS. HOBBS: OKAY. AND HOW WOULD YOU GO AND EXPLAIN THAT TO SOMEBODY ELSE? IS THERE A WAY TO DRAW A PICTURE OR EXPLAIN IT IN A WAY FOR SOMEBODY ELSE TO UNDERSTAND?

Nudging

ALYSSA: I GUESS WE COULD DRAW A PICTURE...SOMEHOW. LIKE WE, INSTEAD OF -

JACKIE: - OH, YEAH, 6 CIRCLES [WITH 12 INCHES IN THEM...PLUS THE] REMAINDER OF 5.

ALYSSA: [YEAH, YEAH, THAT'S WHAT I WAS THINKING!] ... - YEAH, YOU COULD DO THAT -

MRS. HOBBS: MMM...

ALYSSA: - TO EXPLAIN IT.

MRS. HOBBS: VERY INTERESTING. I'M GOING TO COME BACK AND CHECK THAT OUT.

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Critical Features of a Nudge

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Critical Features of a Nudge

Initiated by the teacher

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Critical Features of a Nudge

Contingent on elicited student thinking

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Critical Features of a Nudge

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Critical Features of a Nudge

Maintains student sense-making and ownership

MRS. HOBBS: OKAY. AND HOW WOULD YOU GO AND EXPLAIN THAT TO SOMEBODY ELSE? IS THERE A WAY TO **DRAW A PICTURE** OR EXPLAIN IT IN A WAY FOR SOMEBODY ELSE TO UNDERSTAND?

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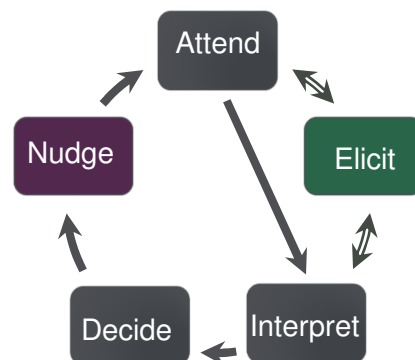
What Characterizes a Math Conference?

MATH CONFERENCES WERE CHARACTERIZED BY THE PRESENCE OF TWO KEY EPISODES:

- **ELICITING** OF STUDENT THINKING

- **NUDGE**, DEFINED AS:

1. Initiated by the teacher to advance mathematical thinking, engagement in math practices, or collaboration
2. Contingent on elicited thinking
3. Taken up by students and co-constructed with them
4. Maintains sense-making and student ownership



Typology of Nudges

Nudge Type	Description
Conceptual Understanding	<ul style="list-style-type: none"> Focuses attention on the underlying meaning of the task and the concepts it represents
Developing a Strategy	<ul style="list-style-type: none"> Coaches students to develop a strategy for the current problem Students maintain ownership over the choice of strategy
Communication	<ul style="list-style-type: none"> Prompts students to articulate thinking Often a rehearsal for writing or sharing
Representation	<ul style="list-style-type: none"> Prompts students to develop ways to represent the task, thinking, or strategy
Collaboration	<ul style="list-style-type: none"> Orients students to each other's thinking (Chapin et al., 2013) and focuses efforts on joint work May include deliberately structuring more equitable dialogue

Conceptual Understanding Nudge: An Example

MS.McMILLAN: OKAY, SO WH-, **HOW MANY TOTAL INCHES IS 2 FEET AND 4 INCHES?**

JOSE: 12

ERIC: 12. WAIT.

ADAN: OH...24.

MS.McMILLAN: 24? JUST 24? TWO FEET IS 24 INCHES. WHAT ABOUT THE OTH-, YOU SAID 2 FEET AND WHAT?

ADAN: 4 INCHES.

MS.McMILLAN: 2 [FEET AND 4 INCHES], SO, SO, OH, 28 INCHES... OKAY, SO -

ALL STUDENTS: [28, 28]

ADAN:

- **AND THIS IS THE SAME AS THIS.**

MS.McMILLAN: **OH...HOW DO YOU KNOW THAT?**

ADAN: BECAUSE [IT'S THE SAME]

ERIC: [IT'S THE SAME.] IT'S EQUAL.

MS.McMILLAN: OH, BECAUSE, OH, OKAY...

ERIC: TH-, IT'S EQUAL PARTS -

ADAN: - AND, AND THIS IS THE SAME AS THIS.

MS.McMILLAN: OH [...OKAY.] SO YOU ONLY HAVE TO DO HALF THE WORK IT SOUNDS LIKE, HUH?

ERIC: [THIS ONE -]

ADAN: UH-HUH.

Conceptual Understanding Nudge: Sample Questions

THESE MOVES ARE **HIGHLY CONTEXT DEPENDENT** – TO THE TASK, THE CONCEPTS, AND THE STUDENTS.

SOME POSSIBLE QUESTIONS INCLUDE:

- What is happening in the story?
- How could we act that out?
- What do you see in your mind as we read this story?
- Let's go back to the task. What does it say about...?
- What are we trying to figure out?

Developing a Strategy Nudge: An Example

MRS. HOBBS: OKAY. WELL, **WHAT DO YOU UNDERSTAND ABOUT IT THOUGH?**
(PAUSE) **WHAT ARE YOU GOING TO DO WITH THIS?**

GEORGE: I, UH, I...I HAVE ANOTHER RULER BUT I DON'T KNOW WHERE IS IT.

MRS. HOBBS : OKAY -

GEORGE : - MAYBE SHE DO -

MRS. HOBBS : - **OKAY, SO, SO WHAT ARE YOU GOING TO DO WITH THAT THOUGH?**

GEORGE : I WANT TO CIRCLE THE NUMBER AND THEN I WANT SEE...BY FOOT. THEN I...THEN I...

MRS. HOBBS : **YOU HAVE AN IDEA. WHAT IS IT?**

GEORGE : MY NUMBER IS 64...MY NUMBER IS 64 INCHES, SO I WANT TO CONTINUE 'TIL TO GET TO 64 -

MRS. HOBBS : - OH, OKAY -

GEORGE : - AND THEN WE DON'T GET TO 64, WE PUT INCHES.

Developing a Strategy Nudge: Sample Questions

THESE MOVES ARE **HIGHLY CONTEXT DEPENDENT** – TO THE TASK, THE CONCEPTS, AND THE STUDENTS.

SOME POSSIBLE QUESTIONS INCLUDE:

- What **could** you try...?
- Is there a tool that could help you?
- What do you understand about...?
- Tell me about your idea.
- **You have an idea. What is it?**
- How could we do it a different way?
- What else could you do?

Communication Nudge: An Example

MS. McMILLAN: VERY INTERESTING. **SO WHENEVER, IF I ASKED YOU TO COME UP THERE, CAN YOU GUYS EXPLAIN IT TO THE CLASS? DESTINY, ARE YOU GOING TO BE ABLE TO EXPLAIN IT?**

DESTINY: MMM...

MS. McMILLAN : **DESTINY, TELL ME WHAT SHE JUST SAID.**

DESTINY : WE, UM... WE SUBTRACT 67 AND 12...AND THEN WE KEPT ON GOING...

MS. McMILLAN : OKAY, SO **TELL ME WHY** YOU SUBTRACTED 12 – WHAT DOES THAT MEAN?

MONICA: BECAUSE 12 IS, UM, ONE FOOT.

MS. McMILLAN : OKAY, DESTINY, **WHAT DOES THAT MEAN?** HOW COME YOU SUBTRACTED 12 OUT OF THERE? (PAUSE) DID YOU JUST PICK A NUMBER? DID YOU HAVE A REASON?

DESTINY : BECAUSE ONE FOOT IS 12 [INCHES]

Communication Nudge: Sample Questions

- How would you **explain** that to someone else?
- When I call on you to share how will you **convince** the class that you thinking makes sense?
- Can you retell what your partner said?
- Can you tell what you did first, then next, and put it all together?
- How can you write what you just told me?
- How can you add those ideas into your writing?

Representation Nudge: An Example

TEACHER: OKAY. AND HOW WOULD YOU GO AND EXPLAIN THAT TO SOMEBODY ELSE? **IS THERE A WAY TO DRAW A PICTURE OR EXPLAIN IT IN A WAY FOR SOMEBODY ELSE TO UNDERSTAND?**

STUDENT 2: I GUESS WE COULD DRAW A PICTURE...SOMEHOW. LIKE WE, INSTEAD OF -

S1: - OH, YEAH, 6 CIRCLES [WITH 12 INCHES IN THEM...PLUS THE] REMAINDER OF 5.

S2: [YEAH, YEAH, THAT'S WHAT I WAS THINKING!] ... - YEAH, YOU COULD DO THAT -

TEACHER: MMM...

S2: - TO EXPLAIN IT.

Representation Nudge: Sample Questions

- How could you **draw** a picture of that?
- How could you show that?
- Is there a way you could **represent** that idea on paper?
- How could you capture all that thinking on paper so we don't lose it?
- What kind of picture could make your thinking clear to someone else?
- How could you **label** your picture to make the parts clear?

Collaboration Nudge: An Example

MRS. HOBBS (TO CHRISTIAN): **SO, DID YOU HEAR THAT? DID YOU HEAR WHAT HE SAID?**

CHRISTIAN: MMHM.

MRS. HOBBS (TO CHRISTIAN): **WHAT DID HE JUST SAY? (PAUSE)**

CHRISTIAN : WELL, I KNOW WHAT YOU SAID.

MRS. HOBBS : OKAY. **CAN YOU TELL ME WHAT JORGE JUST SAID?**

CHRISTIAN : NO. I KNOW WHAT YOU SAID.

MRS. HOBBS : OKAY. **JORGE, CAN YOU EXPLAIN WHAT YOU JUST SAID AGAIN?**

JORGE: UM, SINCE THERE'S 19 ON EACH SIDE AND 18 ON EACH SIDE, JUST MULTIPLY 19 X 2 AND 18 X 2, AND THEN ADD UP THE ANSWERS...

S1: THAT'S WHAT I WAS THINKING.

MRS. HOBBS (TO CHRISTIAN): **OKAY, DOES THAT MAKE SENSE TO YOU?**

CHRISTIAN : MMHM.

MRS. HOBBS (TO CHRISTIAN): **WHY DID HE SAY 19 X 2 AND 18 X 2? (PAUSE)**

MARK: I KNOW.

CHRISTIAN: UM, BECAUSE THERE'S TWO, LIKE, 18 WOULD UP HERE AND HERE.

Collaboration Nudge: Sample Questions

- **What did you hear your partner say?**
- Can you **revoice** (or retell) your partner's idea?
- Can you explain your thinking to your partner?
- What is your partner doing right now?
- Ask your partner a question.
- Do you **agree or disagree**? Why?
- What are you going to do together next?
- How is your partner going to participate in this work?

How could you nudge?

MRS. HOBBS: So tell me what you guys were thinking.

JOZEF: Since there is 12 in one foot, we put 67 minus 12, and then 55 minus 12, and then minus-ed it until we didn't have [enough to] minus. And then we got, and then we seen how many twelves we had, and then we added them up and we got 5 feet. And then we had 7 left, so we had 7 inches left.

MRS. HOBBS: [Oh...]

MRS. HOBBS: Very interesting.

What is your interpretation of student thinking?

What **could** you say next?

Reflection

HOW COULD YOU MAKE CONFERRING PART OF
YOUR PRACTICE?

WHAT WILL YOU NEED TO **FOCUS** YOUR ATTENTION ON?

WHAT DO YOU WANT TO **TRY OUT?**

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Jen Munson
jmunson@Stanford.edu

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