

Lessons Learned from Writing Smarter Balanced Performance Tasks

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Goals for this Session

Goals for our session:

- Features of the SB PT

- Sample SB PT

- Our current benchmark project

- Steps YOU can take to modify your current resources

Lessons Learned from Writing PTs

Assessment writing is difficult, enlightening, and humbling work

Being involved in the process of writing and developing performance tasks was valuable professional development for everyone involved

Results from performance task assessments are useful for both teachers and students

There are minimal resources on the current market that collect evidence of student mathematical thinking

Who We Are



10 State Project (The Curtis Center from UCLA had the other 10)

Design and Write High-Quality PTs

Build capacity and understanding of the PTs across the SB states

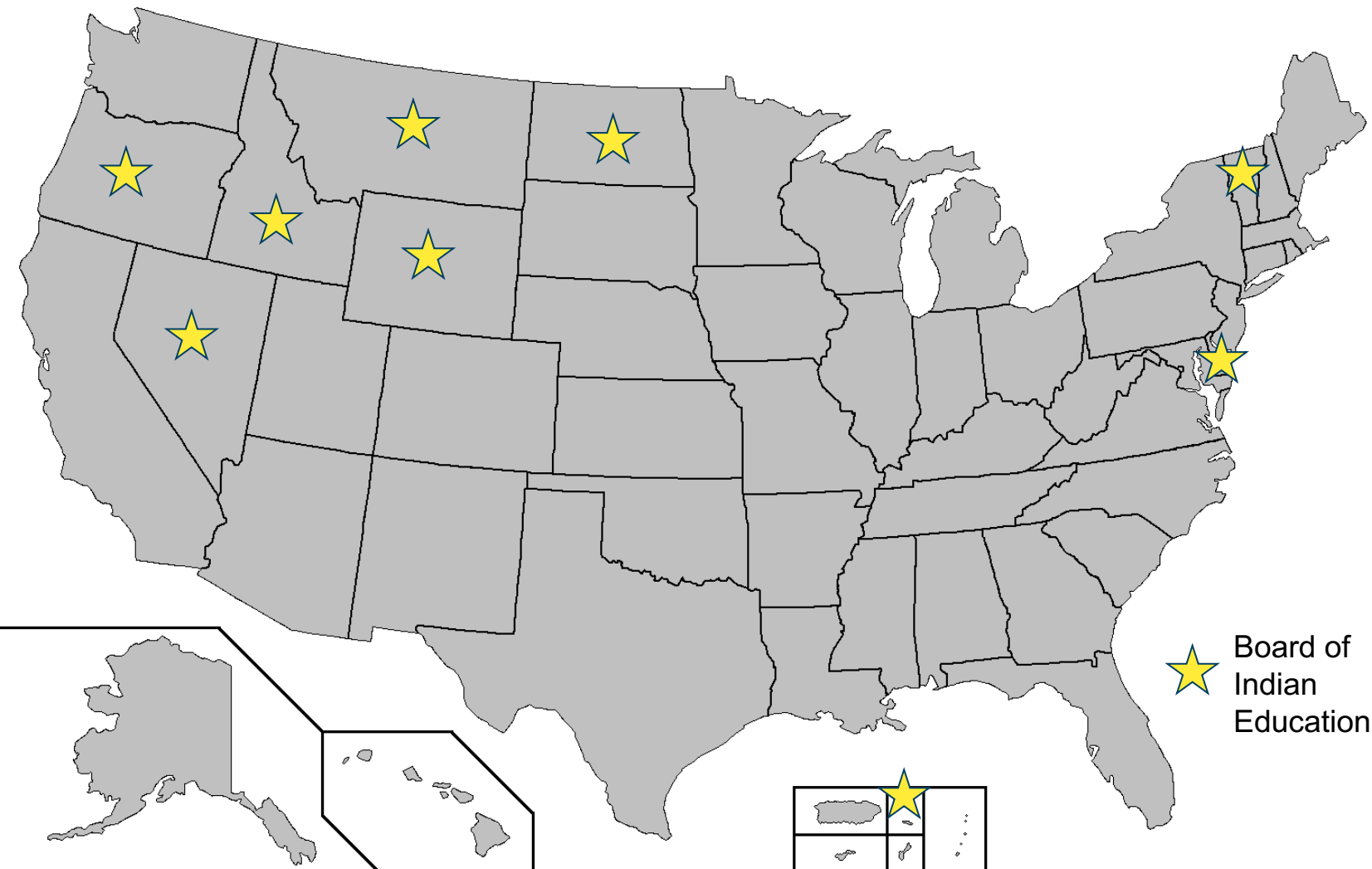
Teachers, TOSAs, Education Leaders from each state

3 Writing Cycles facilitated by a Callahan Consulting team member

1 PT per grade level (3 - 8, HS) per writing cycle (plus clones)

10 PT 1 1 1 1 1 1 1 1 1 1 1 1 1

Our 10 States



Features of a Smarter Balanced PT

Claims 2, 3, and 4

Securely Held Content

Depth of Knowledge Level 2 or 3

Rigorous (this does not mean nasty numbers)

3 - 6 Items where the first item is a ramp

A photograph of two young children, a boy and a girl, both wearing white long-sleeved shirts. They are positioned on either side of the frame, facing each other. A red string is stretched between them, connected to two tin cans. The boy on the right is holding one can to his mouth, and the girl on the left is holding the other can to her ear. The background is a plain, light-colored wall.

A woman with long brown hair, wearing a light-colored jacket, is looking upwards with a thoughtful expression. Above her head is a complex, dense network of white arrows on a grey background. The arrows originate from a central point and branch out in many directions, some forming loops and others pointing towards the top right corner, symbolizing a complex system or network.

The diagram illustrates the derivation of the Lorentz transformation. It shows a coordinate system with axes x, y, z and x', y', z' . A light pulse is shown as a sphere expanding from the origin. The diagram includes various mathematical expressions for the Lorentz transformation, such as $x' = \gamma(x - vt)$ and $t' = \gamma(t - vx/c^2)$, and a diagram of a light clock.

Claim 4

The CAT items are used to measure student proficiency of grade level content (focus on Claim 1) while the PT is designed to collect evidence of Claims 2, 3, and 4 using securely held content

What does “Securely Held Content” mean?

Sample Performance Task

5th Grade

Please take a few minutes
to try these items on your
own

Clay Pottery

Lizzie and Zela are interested in making pottery. The following chart shows how much clay is needed to make different projects.

Project	Pounds of Clay Needed
 Small Plate	$2\frac{1}{2}$
 Small Bowl	$1\frac{1}{2}$
 Large Bowl	$3\frac{1}{4}$
 Dinner Plate	$4\frac{1}{2}$
 Mug	$\frac{3}{4}$

Please Share

What do you notice about the items?

Do you have questions or ideas about the Claims?

Does the content seem securely held?

What evidence do these items collect about student mathematical understanding? How do they compare to a decontextualized addition of fractions problem?

Looking at Student Work: Item 3, Claim 4

The image shows a screenshot of a student's work on a math problem. At the top, there is a toolbar with various icons for text formatting (bold, italic, underline, strikethrough), alignment (left, center, right, justified), list creation (bulleted, numbered), indentation, and other functions like undo, redo, and insert. Below the toolbar, the student's work is displayed in a text area. The work consists of a mathematical equation and a paragraph of text. The equation is $3/4 + 3/4 + 3/4 + 3/4 + 3/4 + 3/4 = 4 \frac{1}{2}$. The text below the equation reads: "Zela will need 5 blocks of clay to make a set of 6 mugs. Since the clay blocks only come in one pound blocks you need to round 4 1/2 up." Below the student's work, there is a green horizontal bar with the word "SCORE" on the left and a large number "2" in a circle in the center. Below this bar, there is a green box containing a paragraph of text that provides a detailed explanation of the student's work and the reasoning behind the score.

$3/4 + 3/4 + 3/4 + 3/4 + 3/4 + 3/4 = 4 \frac{1}{2}$

Zela will need 5 blocks of clay to make a set of 6 mugs. Since the clay blocks only come in one pound blocks you need to round 4 $\frac{1}{2}$ up.

SCORE 2

The student correctly calculated that 4 $\frac{1}{2}$ pounds of clay would be needed to create a set of 6 mugs. The student then explained that because clay only comes in one pound blocks, Zela would need to buy 5 blocks of clay. The response contains evidence of the student's competence in problem solving to the full extent that these processes apply to this item.

Looking at Student Work: Item 3, Claim 4

B ***I*** **U** ***I***

$\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{8}$

ABC 

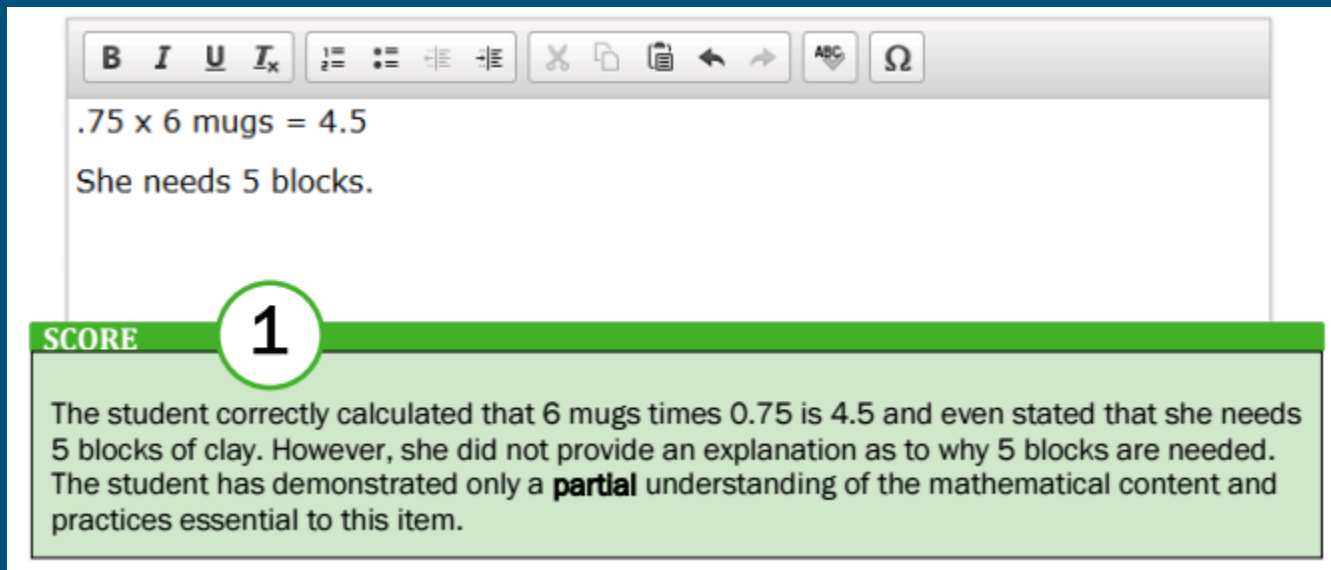
Each mug takes $\frac{3}{4}$ pounds of clay. And 6 times $\frac{3}{4}$ is $\frac{18}{4}$ which is $4 \frac{2}{4}$.
So Zela needs more than 4 pounds of clay, but less than 5 pounds.
She will need to squish together the left over pieces of each block, but she should be able to make all 6 cups with 5 1-pound blocks.

SCORE

2

The student correctly calculated that to make 6 mugs, Zela needs $4 \frac{2}{4}$ pounds of clay. She states that she needs more than 4 pounds, but less than 5 pounds, implying that she understands the clay only comes in 1-pound blocks. The student also understands that leftover pieces of each block will need to be combined to make all 6 mugs with 5 blocks of clay. The response contains evidence of the student's competence in problem solving to the full extent that these processes apply to this item.

Looking at Student Work: Item 3, Claim 4



B I U I_x **≡ ≡ ≡ ≡** **✂** **📄** **📋** **↶** **↷** **ABC** **Ω**

.75 x 6 mugs = 4.5
She needs 5 blocks.

SCORE **1**

The student correctly calculated that 6 mugs times 0.75 is 4.5 and even stated that she needs 5 blocks of clay. However, she did not provide an explanation as to why 5 blocks are needed. The student has demonstrated only a **partial** understanding of the mathematical content and practices essential to this item.

$\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{18}{4}$

Zela needs $\frac{18}{4}$ of clay to make 6 mugs.

SCORE 1

The student correctly calculated that Zela needs $\frac{18}{4}$ pounds of clay to make 6 mugs. However, she didn't take into account the fact that the clay only comes in 1-pound blocks. The student has demonstrated only a **partial** understanding of the mathematical content and practices essential to this item.

B *I* U ~~T_x~~
 $\frac{1}{2} =$ $\frac{3}{4} =$ $\frac{5}{6} =$ $\frac{7}{8} =$
    
ABC Ω

1 mug = $\frac{3}{4}$

$\frac{3}{4} \times 6 = \frac{18}{24}$

I multiplied $\frac{3}{4} \times 6$ and then it equaled $\frac{18}{24}$.

SCORE

0

The student showed initial understanding of the mathematics required, but he/she did not execute the multiplication correctly, nor did they provide an adequate explanation. The explanation given is not a justification for the amount of clay, rather it is a description of the process used. No evidence is present that demonstrates the student's competence in problem solving related to the specified task.

Looking at Student Work: Item 3, Claim 4

The screenshot shows a digital interface for reviewing student work. At the top is a toolbar with various icons for text formatting (bold, italic, underline, subscript), alignment (left, center, right, justified), editing (undo, redo, delete, copy, paste), and insertion (link, unlink, insert table, insert image, insert video, insert audio, insert code, insert link, insert table of contents, insert index, insert table of figures, insert table of contents, insert table of contents, insert table of contents). Below the toolbar is a text input area containing the sentence: "I think Zela will need 6 blocks of clay." Below the text area is a green horizontal bar with the word "SCORE" in white capital letters on the left and a large white circle containing the number "0" in the center. Below the green bar is a light green rectangular box containing the following text: "The student has demonstrated merely an acquaintance with the topic in that he/she at least attempted to answer the question. However, the response contains no support for the answer of 6 blocks by way of work or explanation. No evidence is present that demonstrates the student's competence in problem solving related to the specified task."

I think Zela will need 6 blocks of clay.

SCORE 0

The student has demonstrated merely an acquaintance with the topic in that he/she at least attempted to answer the question. However, the response contains no support for the answer of 6 blocks by way of work or explanation. No evidence is present that demonstrates the student's competence in problem solving related to the specified task.

Lessons Learned from Writing PTs

Assessment writing is difficult, enlightening, and humbling work

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Our Current Work

Developing benchmark assessments that prioritize problem solving, communicating reasoning, and mathematical modeling for schools and districts around the world

Working to better align curriculum, instruction, and assessment with teachers and administrators

What Can You Do Now?

Strategies for revising current textbook questions and/or assessment items:

Think about the quality of the mathematical evidence

Ask yourself: Is this important? Do we really care if a student can answer this question? What does it show us about a student's understanding of mathematics?

Is the question/premiss authentic?

Ask yourself: When would kids authentically encounter this content?

What would a student really ask or do?

Claim 1 versus Claim 2: Let's Cause Problems

Claim 1 Questions involve applying a known procedure in a familiar way

For Example: Find the solution to $|x + 3| < 8$

So, how can we make it more Claim 2?

Claim 2 Modification: Give *two different* inequalities involving absolute value that both have the solution set $\{2 < x < 4\}$

Claim 1 versus Claim 2: Let's Cause Problems

Claim 1 Example: $\frac{2}{5} + \frac{3}{5} = ?$

Claim 2 Modification: Name two fractions with denominator of 5 that sum to 1

Claim 1 Example: Define *rhombus*

Claim 2 Modification: Draw a *rhombus* with a perimeter of 24 cm that is not a square

Claim 1 Example: What is 168×95 ?

Claim 2 Modification: If $1A8 \times 95 = 159A0$, what is the value of A ?

Claim 1 versus Claim 3:

Let's Talk About Reasoning

Take advantage of misconceptions

Claim 1 Example: How many inches is $5\frac{1}{2}$ feet

Claim 3 Modification: Members of your class went home and measured the lengths of their couches. Here are four lengths that your classmates measured:

Candice: 4 feet

Jasper: 62 inches

Paula: $1\frac{1}{2}$ yards

Antonia: 5 feet, 3 inches

Jasper says that his couch is surely the largest because 62 is the largest of the numbers. Do you agree or disagree with Jasper? Explain your reasoning.

(Not a good) Claim 3: Susan claimed that $5\frac{1}{2}$ feet is equivalent to 300 inches. Do you agree or disagree with Susan? Explain your reasoning.

Give it a Shot! Pick one of the following Claim 1 items and try to bump it up to Claim 2 or Claim 3. Be prepared to share.

K-2 Question: $3 + \square = 5$

3-5 Question: Compare the fractions: $\frac{2}{3}$ $\frac{1}{2}$

6-8 Question: $\frac{3}{7} = \frac{x}{21}$

HS Question: Find the slope of the line that is parallel to

$$y = \frac{2}{3}x - 8$$



Claim 4: Mathematical Modeling

The Difference Between Problem Solving and Mathematical Modeling

Strategy #1: Is the Information There?

If you answered *Yes* to this question, it's probably a Problem Solving question

If you answered *No*, it's probably a Modeling question

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Version A: A typical page has 450 words. A typical book has 250 pages. How many books would you need to read to reach one million words?

Version B: You are challenged to read one million words this year. How many books would you need to read to reach that goal?

The Difference Between Problem Solving and Mathematical Modeling

Strategy #2: Design Under Constraints

Many authentic real-life problems do not have one answer. There can often be several possible solutions and the “best” may depend on the assumptions made.

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Version A: For your birthday party, you want to watch a movie, play chess, eat cake, and open presents. The party is from 4 to 7 pm. If you need 45 minutes for playing chess, 1:40 for the movie, and 20 minutes for opening presents, how much time is left for eating cake?

Version B: You are planning your birthday party! You want to watch a movie, play chess, eat cake, and open presents. The party starts at 4 and has to end at 7pm. Make a schedule for your birthday party!

The Difference Between Problem Solving and Mathematical Modeling

Strategy #3: Compare Models

One important aspect of modeling is to compare and verify models

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Version A: Your job pays you \$9 per hour plus a \$50 bonus. How many hours would it take for you to earn \$1000?

Version B: Which would you prefer? \$9 per hour and a \$50 bonus OR \$12 per hour and a \$25 bonus? Why?

Version C: Your boss says that instead of paying you \$9 per hour and a \$50 bonus, he will pay you a higher amount per hour and NO bonus. How much of an hourly raise should you ask for? Why?

The Difference Between Problem Solving and Mathematical Modeling

Strategy #4: Critical Consumer/Myth Buster

We are often confronted with claims that seem hard to believe, either by ads, politicians, or peers. Mathematical modeling is a way to “fact check” some claims.

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Strategy #4: Critical Consumer/Myth Buster

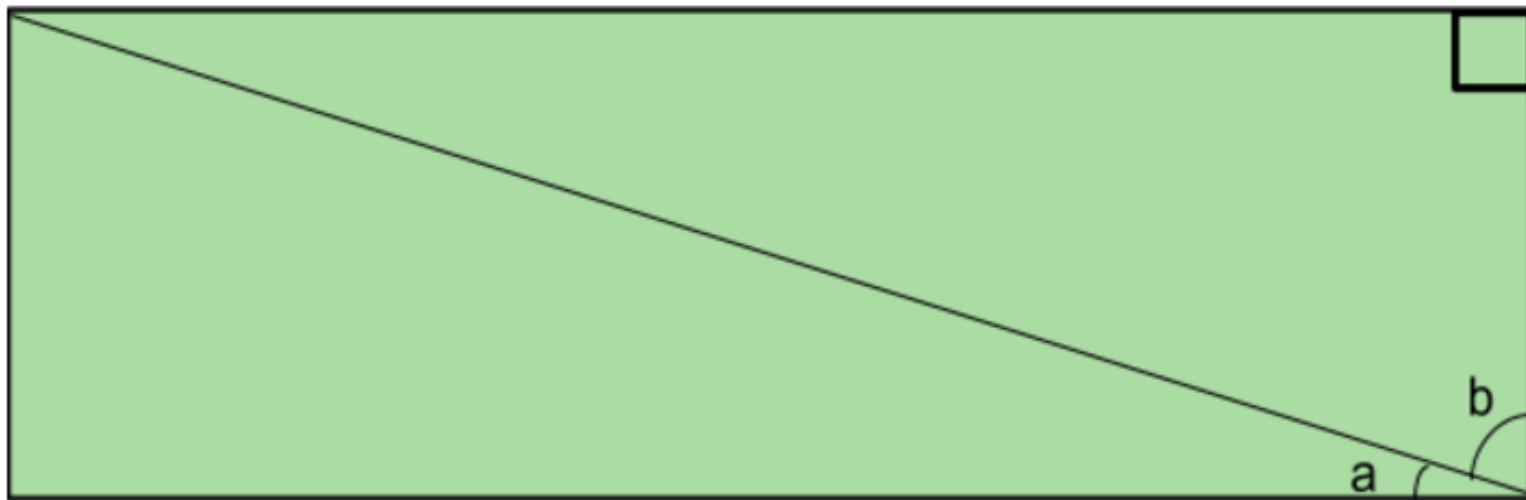
We are often confronted with claims that seem hard to believe, either by ads, politicians, or peers. Mathematical modeling is a way to “fact check” some claims.

Example: According to Wikipedia, 8% of Americans eat at McDonalds everyday! Do you believe this?

Example: Your friend Josh says he loves hot dogs. He has kept count of every hot dog he has eaten since he was a baby. He says that he just ate his 100,000th hot dog! Do you believe him? Why or why not?

Give it a Shot! Take this Claim 2 item and try and bump it up to a Claim 4.

- Your rectangular school playground has been divided diagonally.



If you know the measure of angle a is 32 degrees, what is the measure of angle b?

Thank You!

Please feel free to contact us if you have any questions, comments, or concerns:

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