

Transforming Teaching: Choreographing Change One Step at a Time



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“This song bothers me... If he wants the world to change, he should go out and change it himself. Nothing is going to happen if everyone just waits...”

Jessica Dixon (7th grade)

What is our plan for changing the world?

“This song bothers me... If he wants the world to change, he should go out and change it himself. Nothing is going to happen if everyone just waits...”

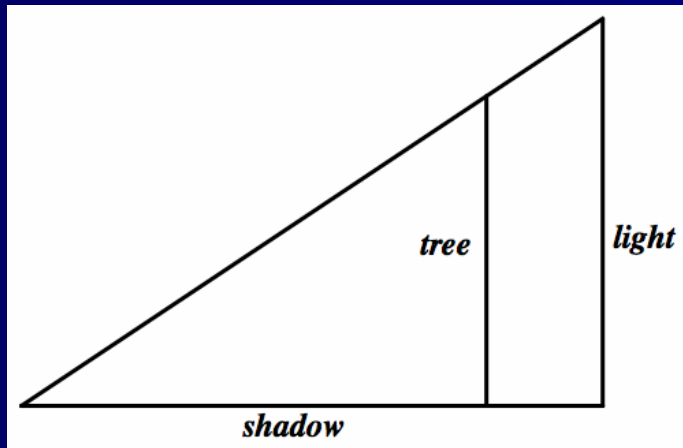
Jessica Dixon (7th grade)

Consider this.

An 8-foot tall tree is planted 3 feet from a street light. The tree casts a shadow from the light of the street light that is 12 feet long. How tall is the street light?

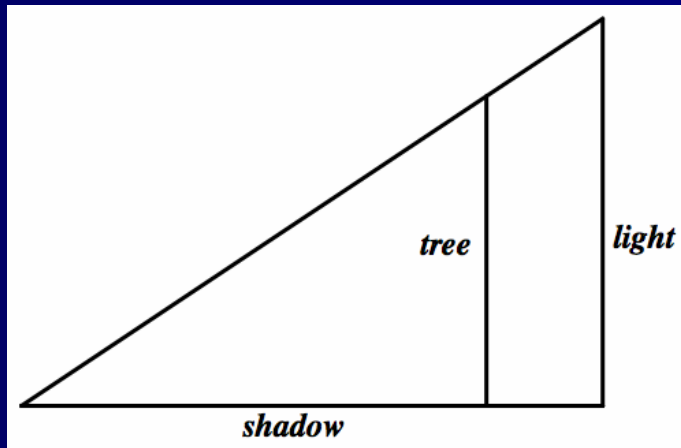
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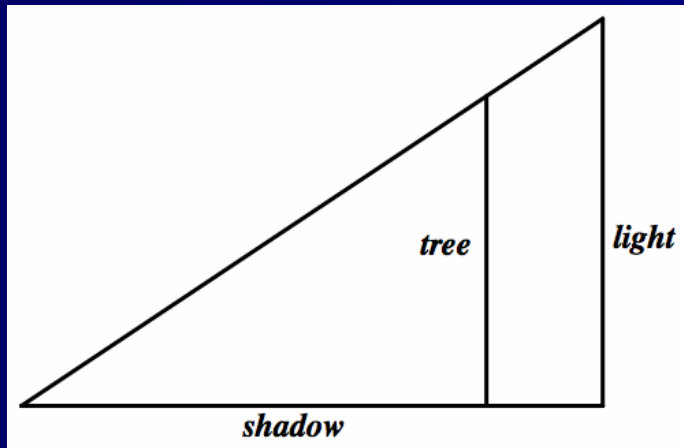
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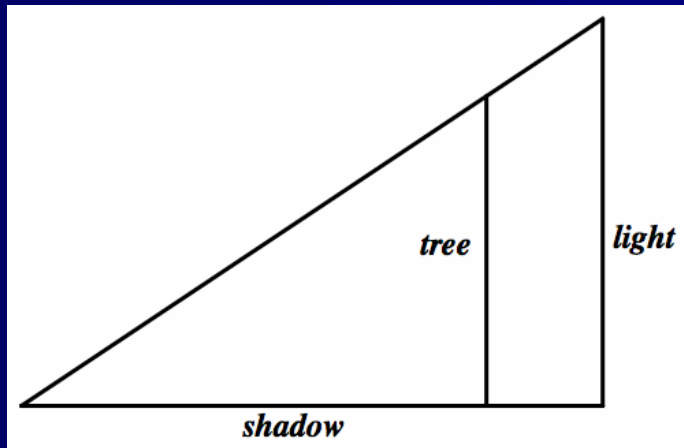


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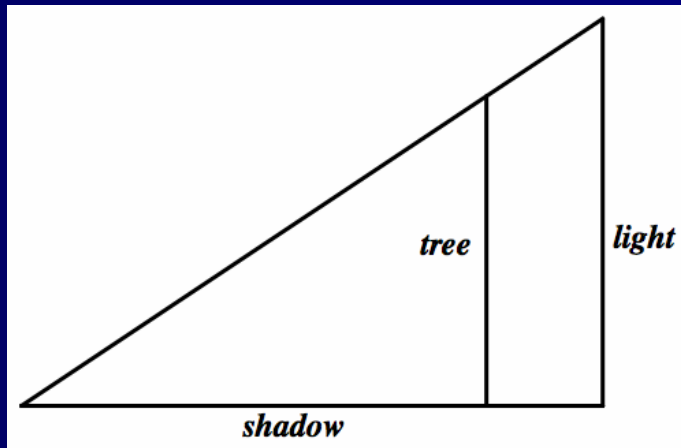
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But why???

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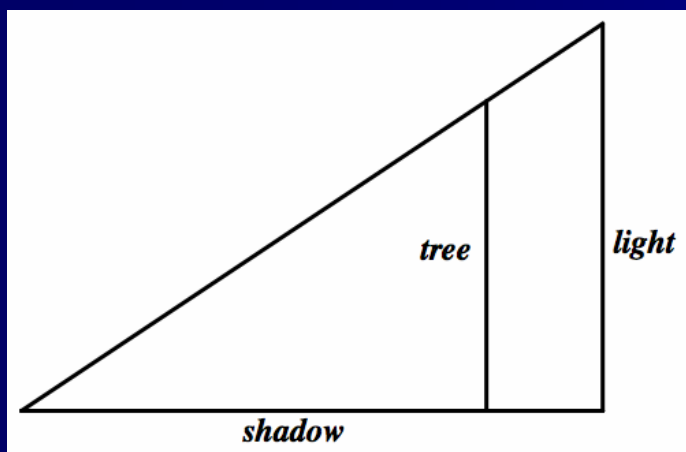


$$\frac{8}{12} = \frac{x}{15}$$
$$12x = (15)(8)$$

This is not a justification

Consider this.

What do teachers and administrators need to know so that they are aware that this sort of teaching is not OK? And how do we get there?



Handwritten student work showing a crossed-out equation and a new one. The original equation $\frac{8}{12} = \frac{x}{15}$ is crossed out with a large 'X'. Below it, the new equation $12x = (15)(8)$ is written.

$$\frac{8}{12} = \frac{x}{15}$$
$$12x = (15)(8)$$

This is not a justification

Goals for this Session

- Explore needs of PD for transforming teaching
- Unpack High Cognitive Demand Tasks (HCDDT)
- Review norms for maintaining HCDDTs
- Discuss images of Common Core classrooms
- Reinforce role of collaborative teams

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Professional Development Foci

Who Needs It?

- School-based Coaches
- Teachers (including Exceptional Educators)
- Administrators
- Parents
- Guidance Counselors (???)

Professional Development Foci

What do they need?

- Don't take for granted that teachers and administrators think like you – take them into classrooms and discuss what you see.
 - Observe together and debrief
 - Use videos like classroom observations
- What do you notice in this grade 6 video?





Professional Development Foci

What did you notice?

- What conversations could this video support for teachers?
- What about for administrators?



Professional Development Foci

Consider this beginning Algebra I problem:

A rectangular garden is fenced on all sides with 160 feet of fencing. The garden is 6 feet longer than it is wide. What is the area of the garden?



Professional Development Foci

Consider this beginning Algebra I problem:

A rectangular garden is fenced on all sides with 160 feet of fencing. The garden is 6 feet longer than it is wide. What is the area of the garden?

- How do you present this problem?
- What do you look for?
- What do you ask?
- With which SMPs do you plan for student engagement?



Professional Development Foci

What about this one?

A rectangle with sides of length $n + 2$ and n is compared to a square with sides of length $n + 1$. Tim says that the two shapes are equal in area. Explain Tim's mistake.

- How do you present this problem?
- What do you look for?
- What do you ask?
- With which SMPs do you plan for student engagement?



Professional Development Foci

What do they need?

- Understanding of where their content fits along the progression
 - Use progressions to plan PD
 - <http://ime.math.arizona.edu/progressions/>
 - Work in horizontal AND vertical teams
- Content knowledge for teaching their grade
 - Be careful of grade-band switching
 - Grade 5 is a big content grade in elementary



What about the Tasks?

How do we support teachers to choose tasks well and maintain their cognitive demand?

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High Cognitive Demand Tasks

“the highest learning gains on a mathematics-performance assessment were related to the extent to which tasks were set up and implemented in ways that engaged students in high levels of cognitive thinking and reasoning (Stein and Lane 1996)”

p. 4

Smith, M. S. & Stein, M. K. (2012). Selecting and creating mathematical tasks: From research to practice. In G. Lappan, M. K. Smith, & E. Jones (Eds.), *Rich & Engaging Mathematical Tasks Grades 5–9*. Reston, VA: National Council of Teachers of Mathematics, 4-10.

Four categories of cognitive demand

Lower-level
Demands

- Memorization
- Procedures without connections

Higher-level
Demands

- Procedures with connections
- Doing mathematics

in Stein and Smith (1998) p. 4-5

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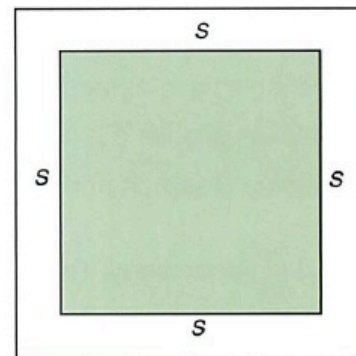
Where was the garden problem?

Where is this on the HCDT Continuum?

Tiling Tubs

Name _____

Hot tubs and in-ground swimming pools are sometimes surrounded by borders of tiles. This drawing shows a square hot tub with sides of length s feet. This tub is surrounded by a border of square tiles. Each border tile measures 1 foot on each side.



1. How many 1-foot square tiles will be needed for the border of a square hot tub that has edge length s feet? _____
2. Express the total number of tiles in as many ways as you can. _____

What do you see?

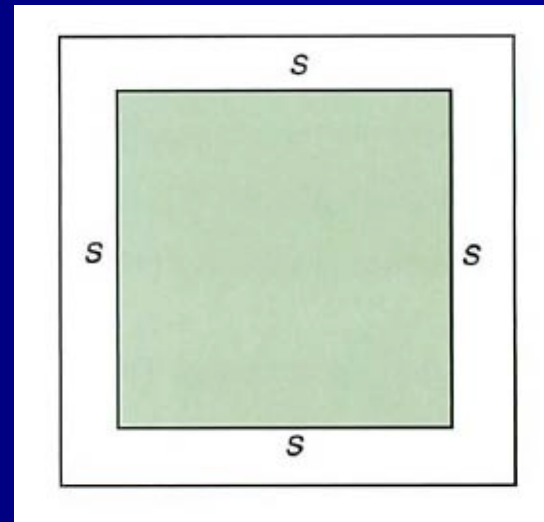
$$4s + 4$$

$$2(s + 2) + 2s$$

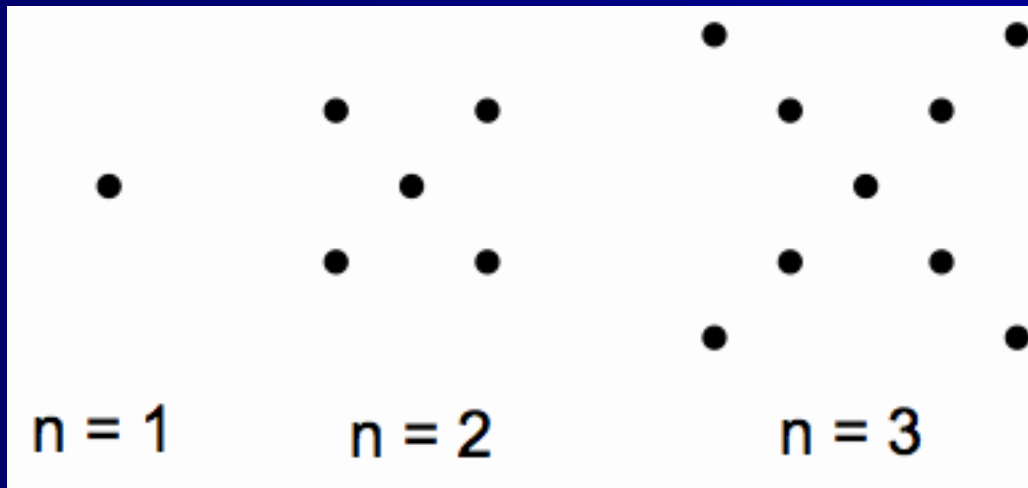
$$4(s + 2) - 4$$

$$4(s + 1)$$

$$(s + 2)^2 - s^2$$



What could you do with this problem?



Norms for Maintaining HCDTs

“Research by Stein and colleagues (Henningesen and Stein 1997; Stein and Lane 1996; Stein, Grover, and Henningesen 1996) makes the case resoundingly that cognitively challenging tasks that promote thinking, reasoning, and problem solving often decline during implementation as a result of various classroom factors”

p. 11

Smith, M. S., Bill, V., & Hughes, E. K. (2012). Thinking through a lesson: Successfully implementing high-Level tasks. In G. Lappan, M. K. Smith, & E. Jones (Eds.), *Rich & Engaging Mathematical Tasks Grades 5–9*. Reston, VA: National Council of Teachers of Mathematics, 11-17.

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Where is this on the test?

Norms for Maintaining HCDTs

"Choose all that apply"

My new favorite phrase 😊

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**How are norms evident in
this grade 8 video?**






How are norms evident in this video?

Students must:

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- make sense of classmates' solutions.
- communicate when they don't understand or don't agree.

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Watch the teacher moves in this grade 7 video

- How is student engagement in the SMPs supported?
- What are teacher moves that focus on class norms?
- Who is doing most of the talking?
- How can we use shared images to support our efforts to choreograph change?





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Math Reveals Perfectly Cozy Penguin Huddles

LIVESCIENCE.COM

Stephanie Pappas, LiveScience Senior Writer - Fri, Nov 16, 2012

Greed is good for penguins that huddle together to avoid Antarctica's icy weather.

According to a new study, [penguin groups](#) can maximize everyone's heat when individual birds act selfishly, huddling in ways that keep them toastiest.

"Even if penguins are only selfish, only trying to find the best spot for themselves and not thinking about their community, there is still equality in the amount of time that each penguin spends exposed to the wind," study researcher Francois Blanchette, a mathematician at the University of California, Merced, who normally studies fluid dynamics, said in a statement.



There are clear differences between penguins and people. When penguins are selfish, only watching out for themselves – they are watching out for the team by design.



When teachers are selfish, only thinking about their own instruction – they are just selfish. There is no collaborative team. It isn't the teachers that are left out in the cold, it is the students.

World-changing Homework



Return to your school or district not as a lone penguin but as an active member of a collaborative team.

Work with a partner or team to transform the teaching you support. Choreograph change one step at a time with the team in mind. Influence horizontally first and then vertically.

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