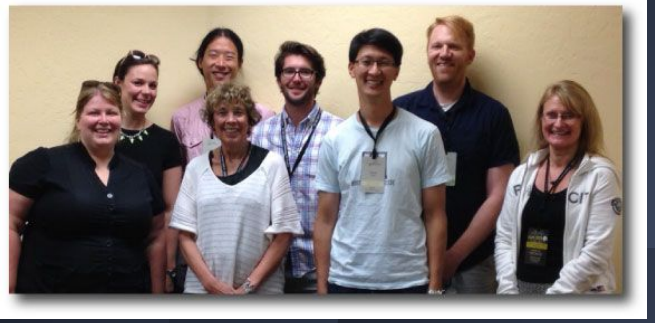
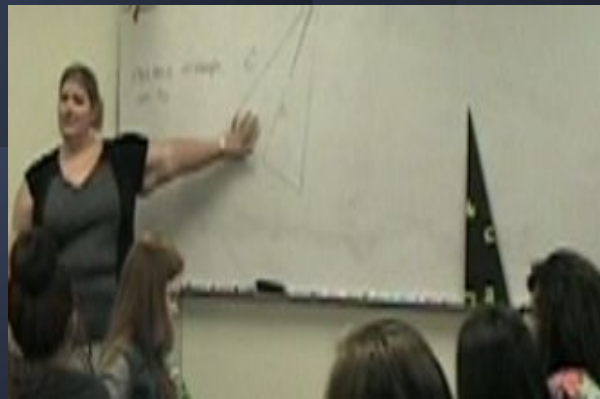


Lesson Study

PCMI, 2015



Who We Are

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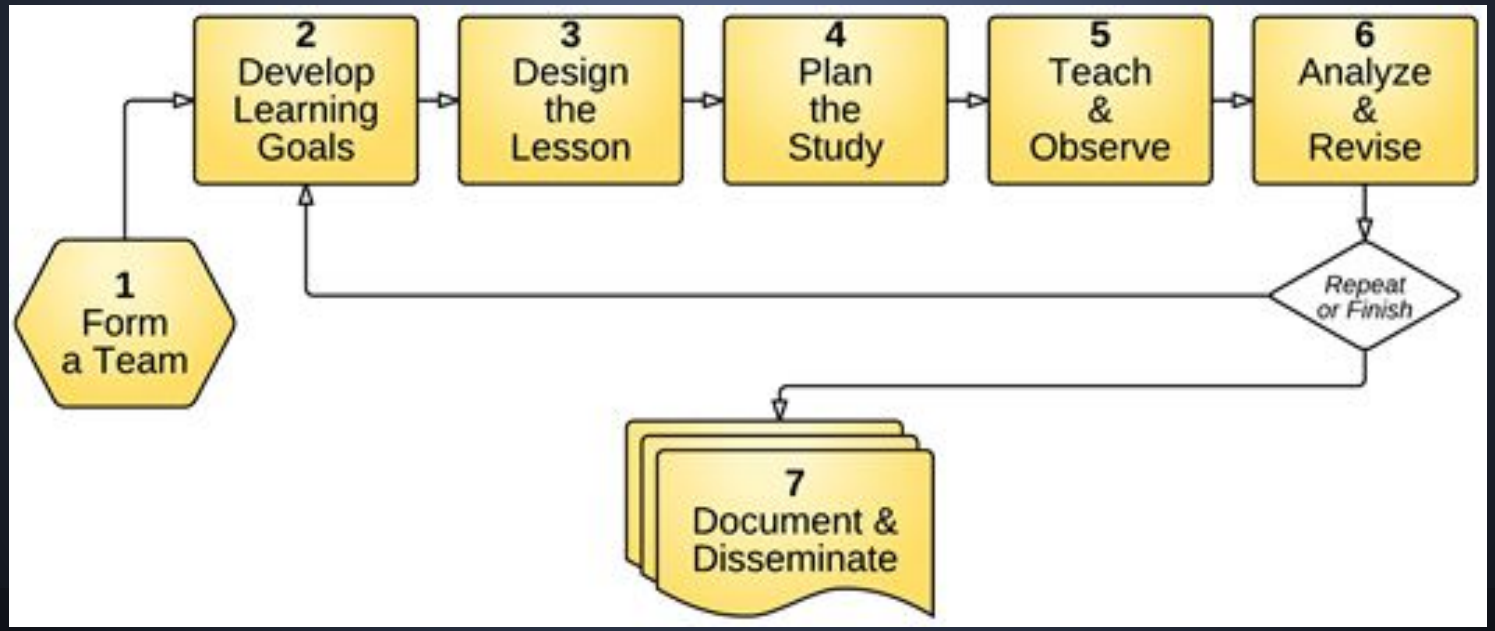
What is Lesson Study?

What are some of your ideas?



Misconceptions about Lesson Study

- The goal of lesson study is to make a perfect lesson.
- Lesson study is theoretical.
- The focus of lesson study is on the teacher.
- Lesson study is only done in Japan.
- It is the expectation that every lesson follow the lesson study format.

Our Takeaways

- No such thing as a perfect lesson!
- Branch points
- Brainstorming process
- Student responses
- Implementation at your school

Sketch of a 3-Part Japanese Lesson

Act 1: Launch/Activation (10 minutes)

Students get prepared for the main lesson by having them evoke prior knowledge, concepts, and strategies.

Act 2: Solve the Problem (30 minutes)

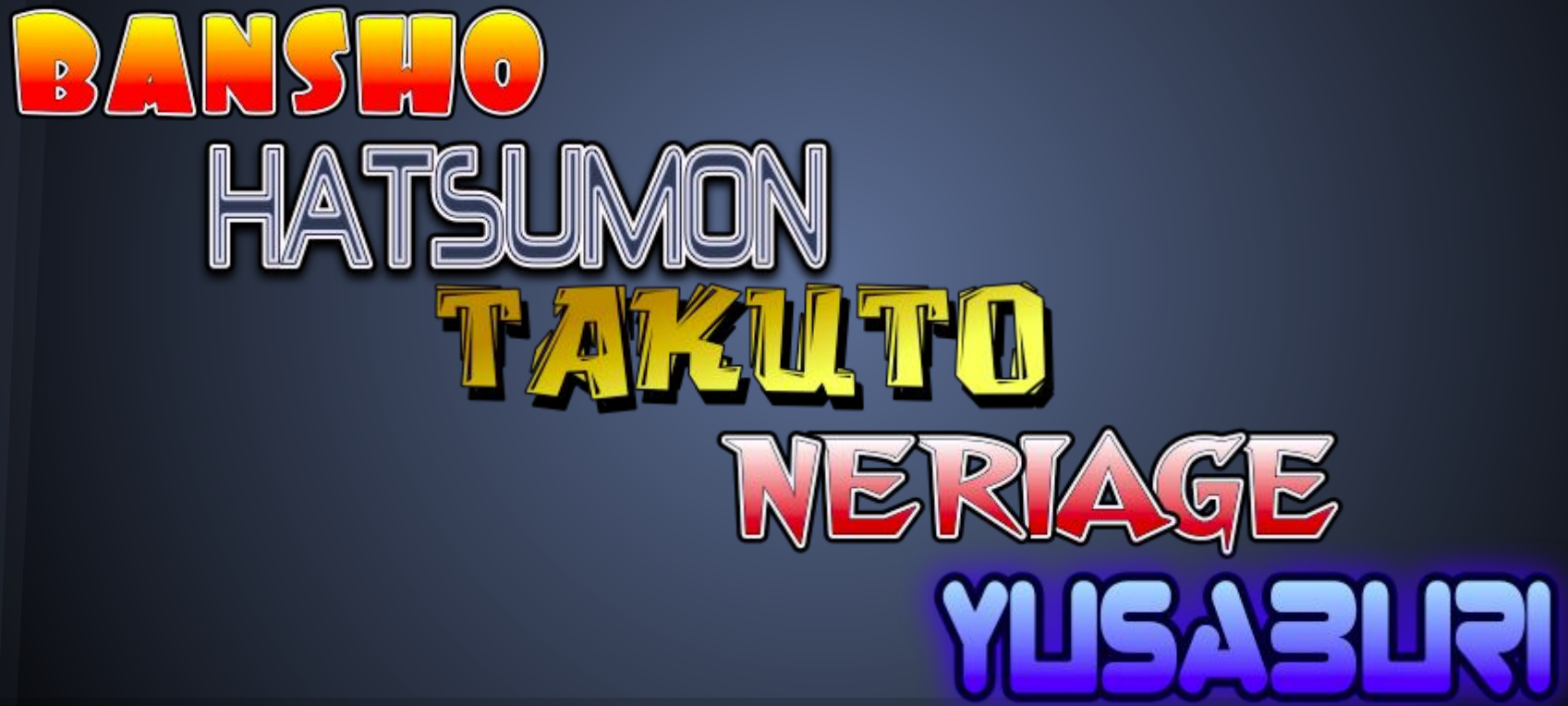
Students are given a task which they actively work through, often individually at first, then in smaller groups. The teacher monitors work, asking questions while selecting students who will share.

Act 3: Connections & Practice (15 minutes)

The teacher facilitates a full class discussion while students share their solution methods. Students make connections and consolidate ideas.

See https://www.youtube.com/watch?v=qCf_tVf_CSM for a video of this in action.

Key Japanese Strategies



Bansho (literally “board writing”)

- The planned management (recording, organizing, and connecting) of student discourse and solutions to make mathematics explicit.
- Anything written is rarely erased.

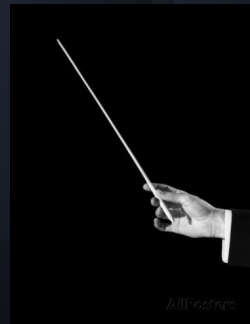
Hatsumon

- Purposeful questioning to stimulate student thinking.
- The questions can be Level 1: factual/recall,
  Level 2: why/how questions about the task, or
  Level 3: questions that foster reasoning/connections.

What is an example of a type of question that we might ask students that supports hatsumon?

Takuto (from German for “baton”)

- The role of the teacher is to facilitate and orchestrate the lesson.
- Effective takuto skillfully uses student thinking (discoveries, strategies, and mistakes) to guide the lesson to achieve the lesson goals.



Neriage (“to polish”)

- The teacher acts as a facilitator of student approaches, making connections among different methods.
- Through full class discussion, the teacher tries to achieve consensus of common misconceptions and optimal solution methods.

Yusaburi

- Strategy to solidify student's pre-existing knowledge (often when this knowledge is memorized or procedural).
- Teacher intentionally disagrees with student to cause student to question him or herself.
- Often done in front of full class.

Strategies in Action

Bansho: Organization of student thinking

Hatsumon: Purposeful questioning

Takuto: Facilitation of student thinking

Neriage: Connections and consolidating

Yusabri: Teacher move to disagree with student

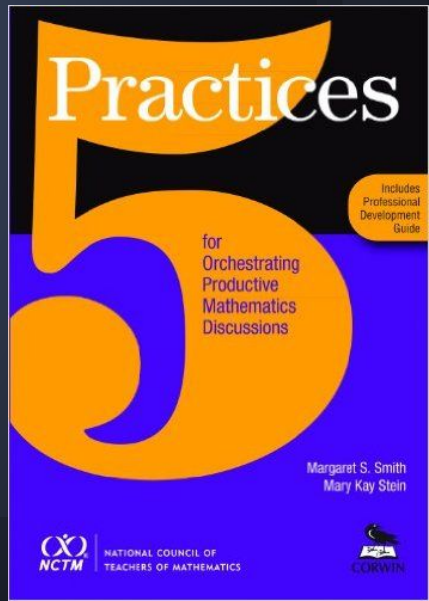
Watch a short clip of an 8th grade lesson from the *TIMMS* video study. Record any examples of these strategies in the chat window.

Video from http://www.timssvideo.com/67

Resource 1: The 5 Practices

Smith and Stein (2011). *5 Practices for Orchestrating Productive Mathematics Discussions.*

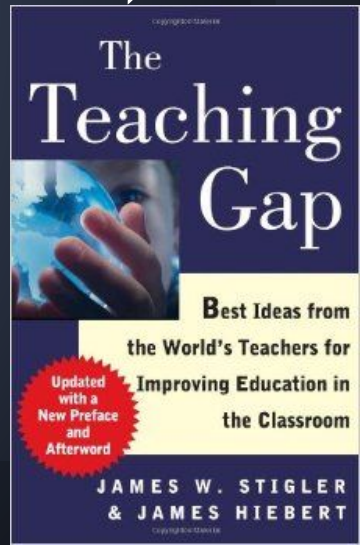
1. Anticipate Student Responses
2. Monitor Student Work
3. Select Work
4. Sequence Work to be Shared
5. Make Connections Among Processes



Resource 2: The Teaching Gap

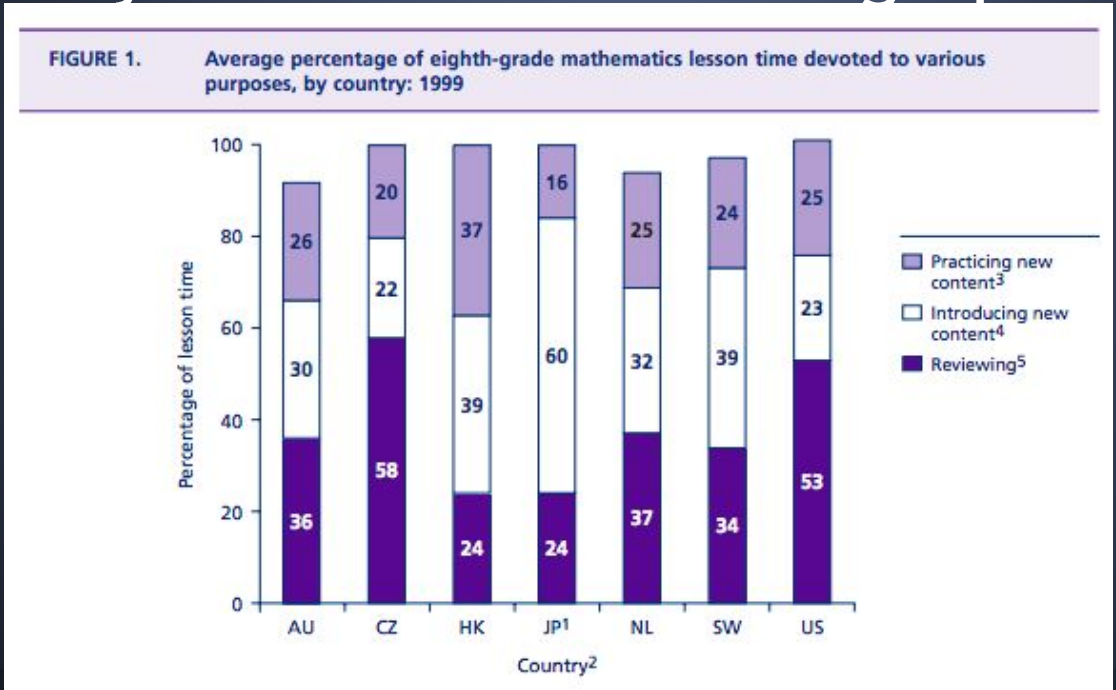
Stigler and Hiebert (1999). *The Teaching Gap*.

1. *TIMMS* studies (4th, 8th, and 12th grades) prompted interest in international comparisons.
2. 1995 *TIMMS Video Study* looked at common teaching and learning practices in US, Germany, and Japan.



TIMMS Video Study 1999

What do you notice from this graphic?



From http://www.timssvideo.com/sites/default/files/TIMSS%201999%20Math%20Highlights.pdf

Our Lesson Study Experience

- How often did we meet?
- What were our lesson goals and audience?
- What did planning look like?
- How did we revise our lesson?

Details

- Met seven times, for two hours each, prior to presenting first practice lesson
- Presented lesson twice
- Post-session debrief each time

Background Info

Learning goal: Recognize and utilize symmetry in geometric figures

Taught twice:

1. 16 PCMI summer camp students
2. 17 students enrolled in credit-recovery at Mountain View HS in Orem, UT

Student Learning Objectives

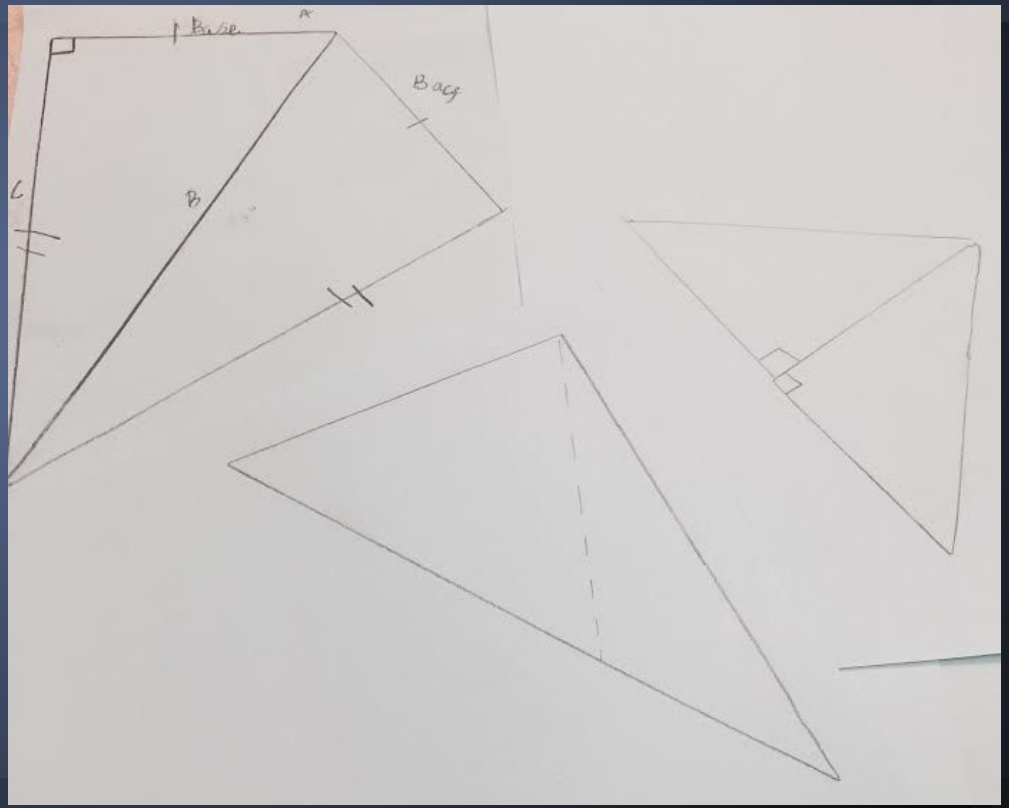
1. Participants will identify properties of isosceles triangles
2. Participants will identify sufficient information to define an isosceles triangle
3. Participants will apply properties of isosceles triangles to find missing information

Planning

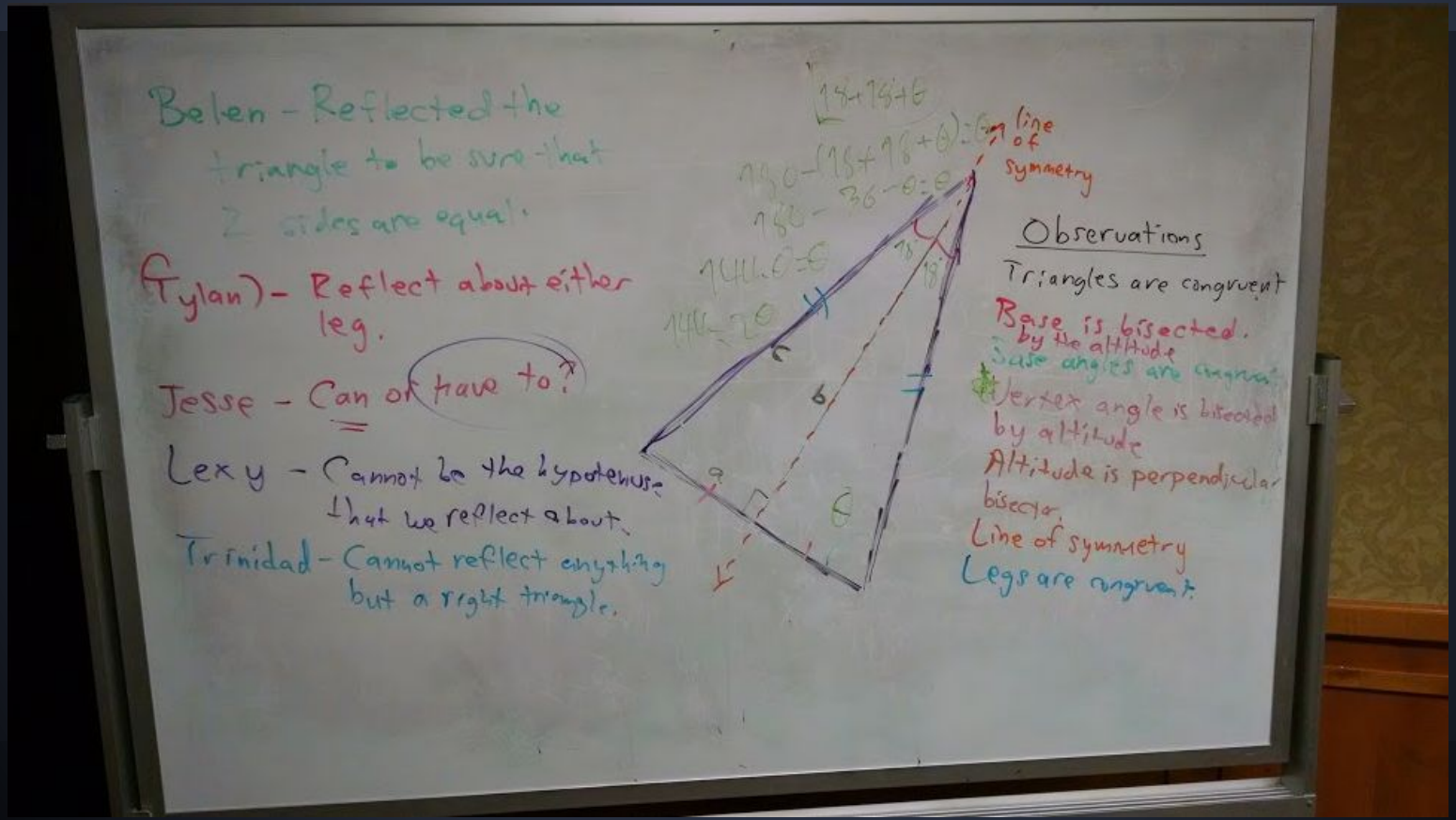
- Spent considerable time developing our overarching goal (symmetry vs. conditional statements).
- Balance between small group work and full group planning.
- Many great ideas had to be tweaked or omitted for time and cohesion.

Act 1: Forming an Isosceles Triangle

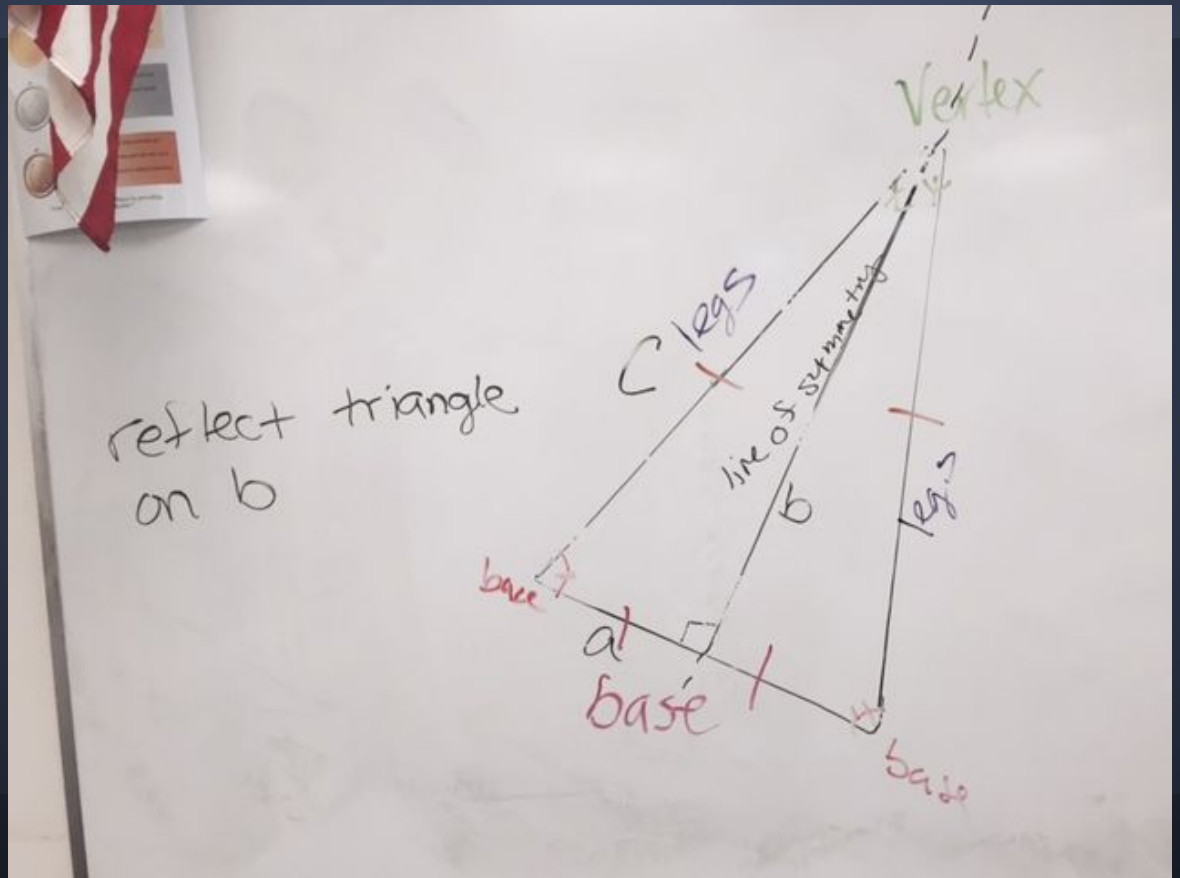
Make an isosceles triangle using a cutout right triangle.



Act 1: PCMI Summer Camp

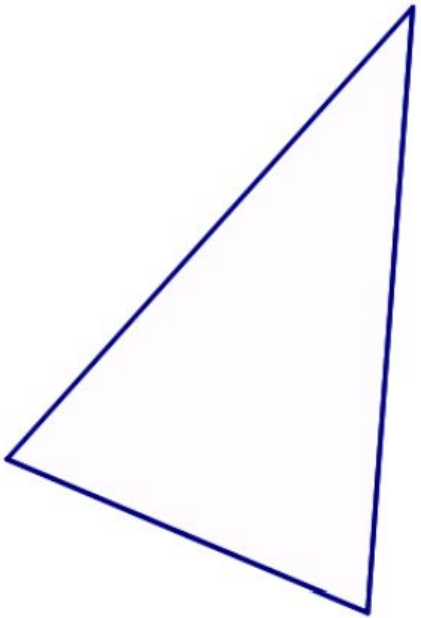


Act 1: Mountain View HS



Act 2: Isosceles Properties

Label this triangle with enough information to show that it is an isosceles triangle.

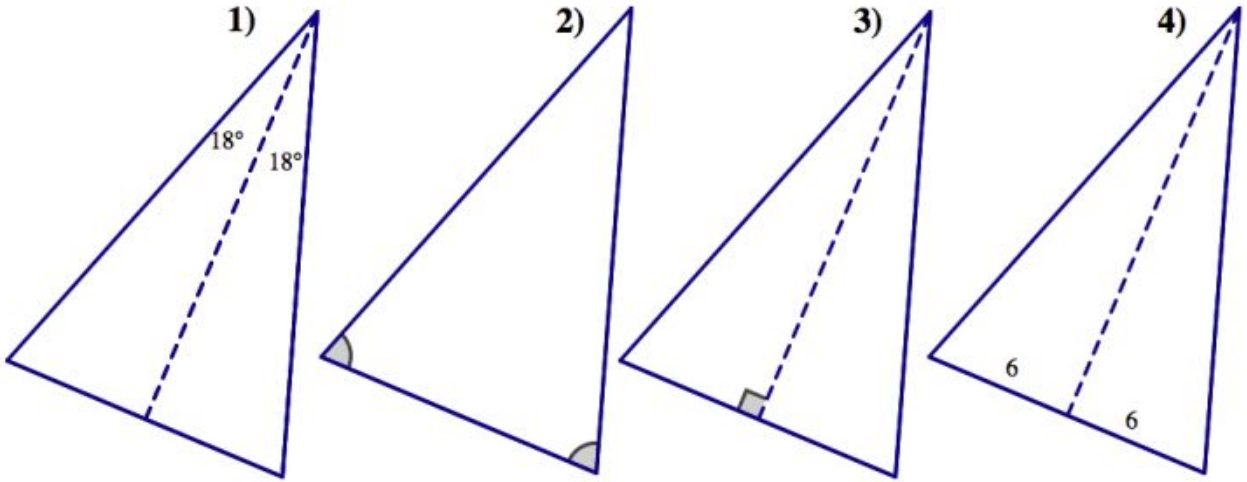


Act 2: Decker & Querelle!

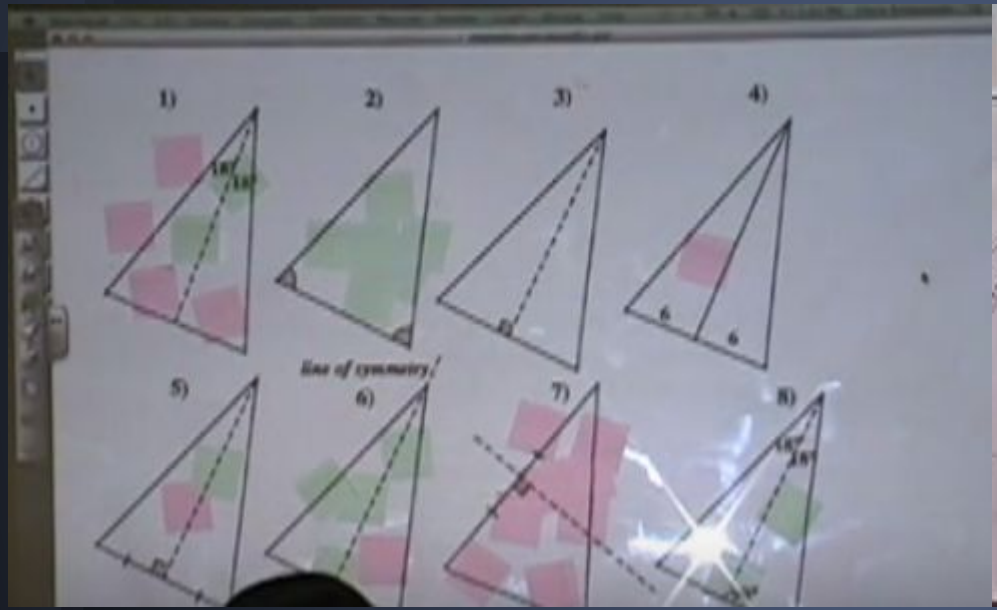
The triangles below are some responses that students gave to the prompt: **"Label this triangle with enough information to show that it is an isosceles triangle."**

In the space below, select one response you agree with and one you disagree with. Be sure to explain your thinking. You are welcome to draw and label additional information on these diagrams. Triangle congruence theorems might also be helpful to support your reasoning.

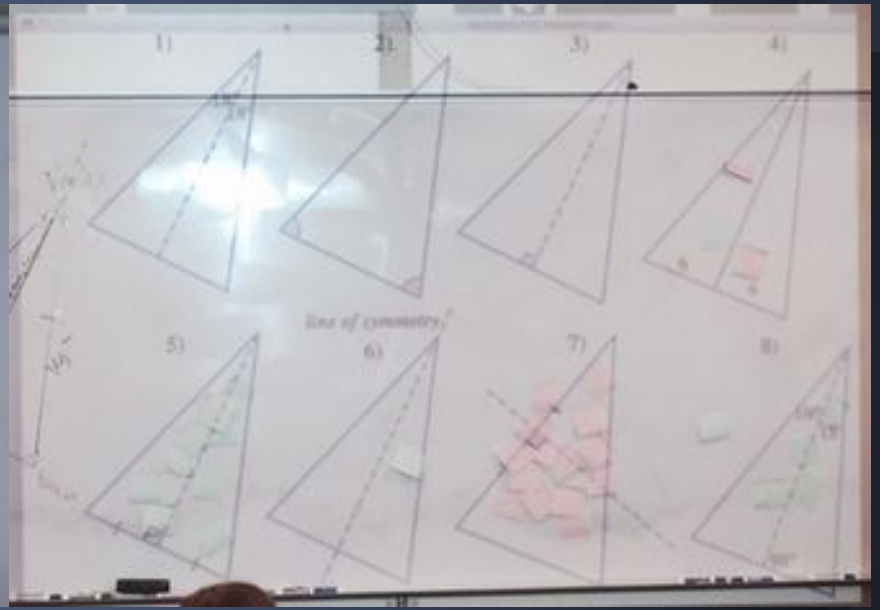
Student Responses:



Act 2: Class Answers



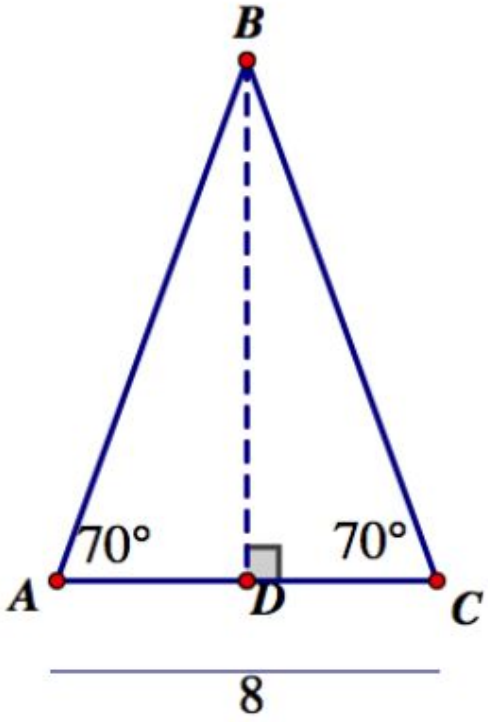
Park City Math Institute Summer Camp



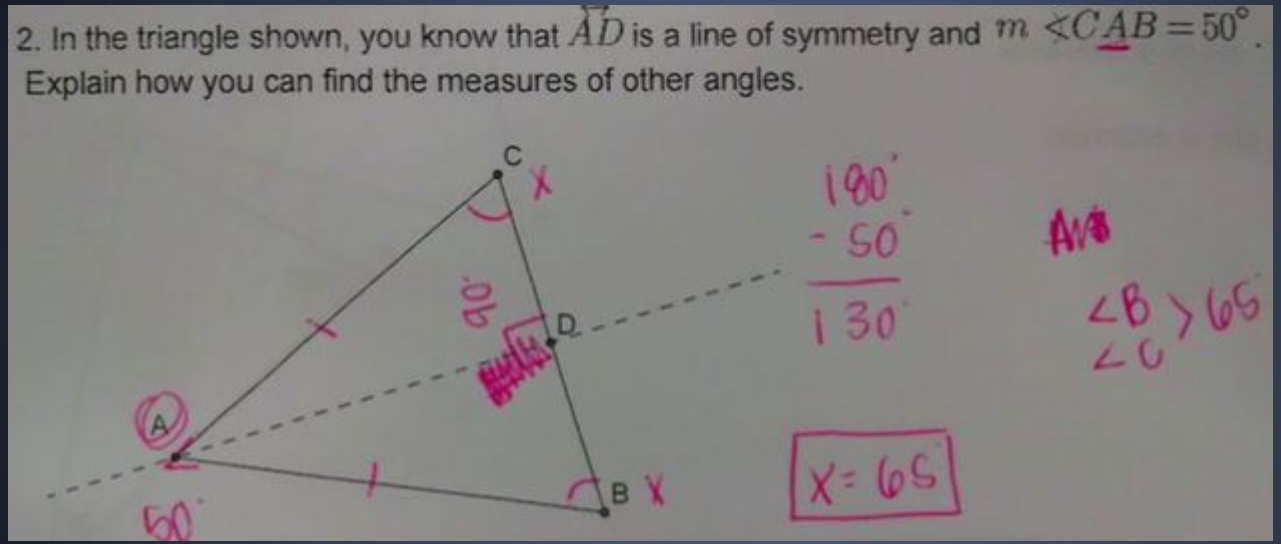
Mountain View HS Credit Recovery Students

Act 2: Hingepoint Question

1. Given the diagram below where $AC = 8$. Which is **not necessarily** true?
   a. $AD = 4$
   b. $\overline{AB} \cong \overline{BC}$
   c. $\overleftrightarrow{BD}$ is a line of symmetry.
   d. $m \measuredangle ABD = 40^\circ$
   e. $\triangle ABC$ is isosceles.



Act 3 Practice



Bringing Lesson Study to Your School

-Classroom-embedded PD

-Requires supportive and collaborative culture (teacher “buy in” important)

-Time is a major factor in planning, observing, and reflecting

Additional Web-Based Resources

An Introduction to Lesson Study

What is Lesson Study?

Taking Professional Learning Into the Classroom

Q & A

What additional questions do you have?