Best Practices in Math to Support Academic Language Development and Conceptual Understanding

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BEAVERTON SCHOOL DISTRICT
THRIVE • CONTRIBUTE • EXCEL

Long Term Target

- Our Goal is for every student to graduate with many **options** and be prepared to…

  - Think: Creative**ly** and **Critically**
  - Know: **Master** Content
  - Act: **Self-Direct** and Collaborate
  - Go: **Navigate Locally** and Glob**ally**

Setting the Stage

- SIOP
- Best Practices in Math
  - Teacher's Development Group
  - Beaverton: Common Core Math Practices
- Constructing Meaning
- Standards-Based Learning
- High Expectations for ALL and Relationships

Teacher-Growth Goal: Student talk with an emphasis on academic language

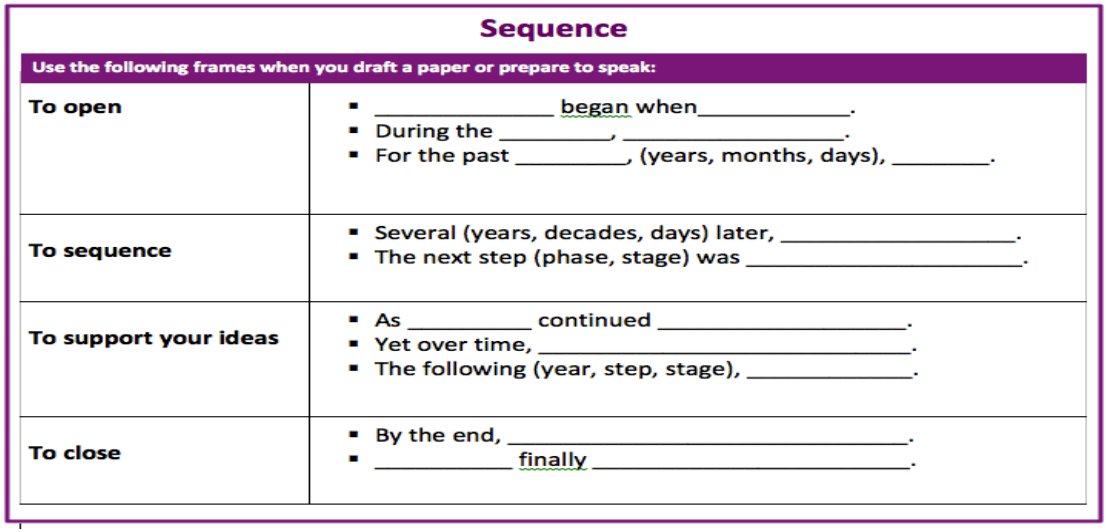
What is Academic Language?

Academic English is a cognitively demanding and relatively decontextualized register (Cummins, 1984). It relies on a broad knowledge of words, concepts, language structures, and interpretation strategies. Skills related to mastery of academic English include summarizing, analyzing, extracting and interpreting meaning, evaluating evidence, composing, and editing. Acquiring academic English is a challenge for English language learners and native speakers. Few children arrive at school competent in this register. For the most part, academic English is learned over the course of schooling through frequent engagement in classroom talk, reading textbooks, and writing. Teachers need to recognize that all students need support to acquire the structures and vocabulary associated with academic English, and they need to know how to provide it.

Lily Wong Fillmore and Catherine Snow What Teachers Need to Know About Language

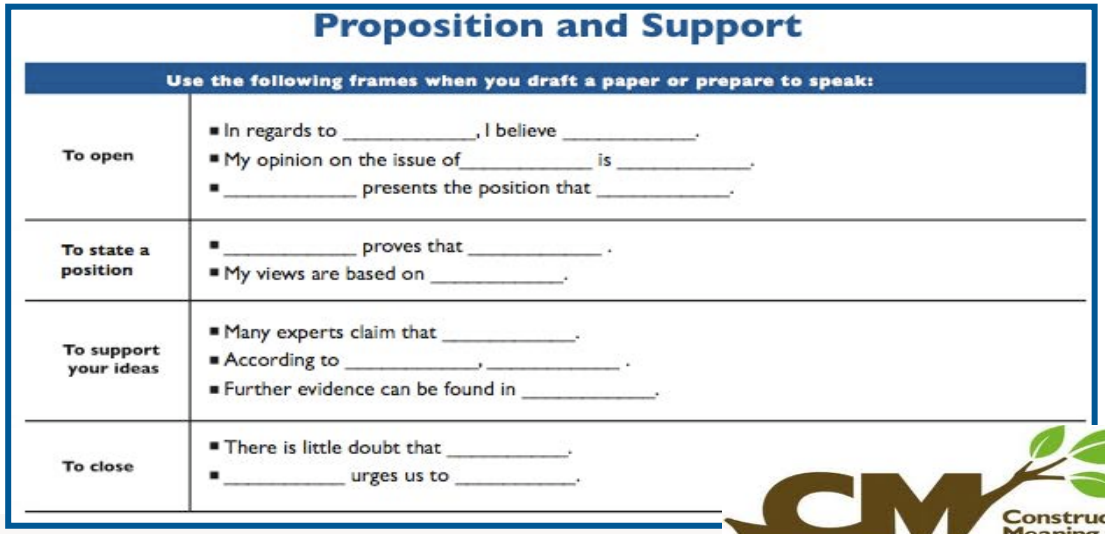
Sentence Frames / Signal Words

- Frames & signal words help
- guide students to produce their own language
  - multiple possibilities in blanks
- focus student learning on the academic task



Sequence

Use the following frames when you draft a paper or prepare to speak:	
To open	▪ _____ began when_____. ▪ During the _____, _____. ▪ For the past _____, (years, months, days), _____.
To sequence	▪ Several (years, decades, days) later, _____. ▪ The next step (phase, stage) was _____.
To support your ideas	▪ As _____ continued _____. ▪ Yet over time, _____. ▪ The following (year, step, stage), _____.
To close	▪ By the end, _____. ▪ _____ finally _____.



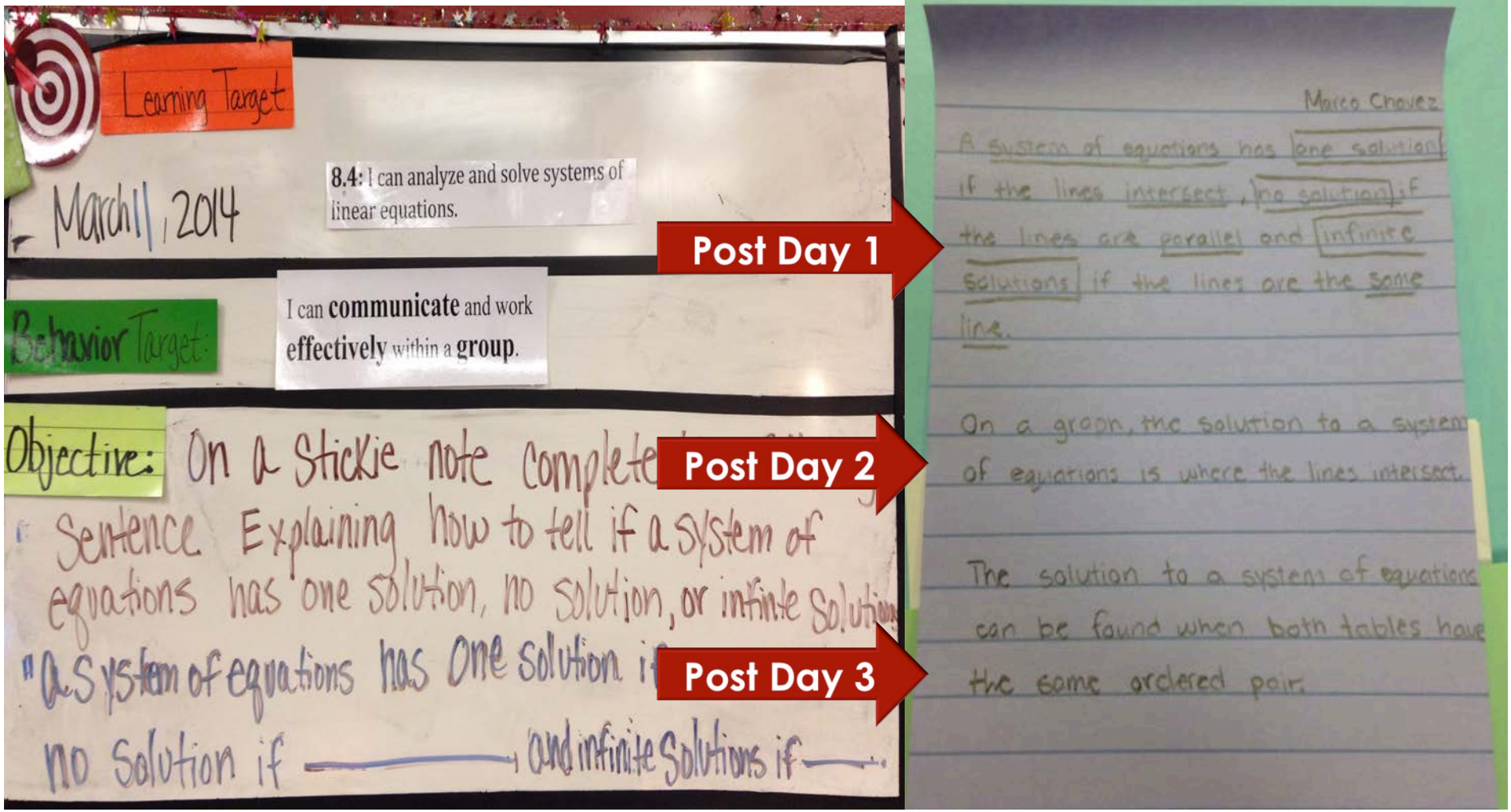
Proposition and Support

Use the following frames when you draft a paper or prepare to speak:	
To open	▪ In regards to _____, I believe _____. ▪ My opinion on the issue of_____ is _____. ▪ _____ presents the position that _____.
To state a position	▪ _____ proves that _____ . ▪ My views are based on _____.
To support your ideas	▪ Many experts claim that _____. ▪ According to _____, _____ . ▪ Further evidence can be found in _____.
To close	▪ There is little doubt that _____. ▪ _____ urges us to _____.

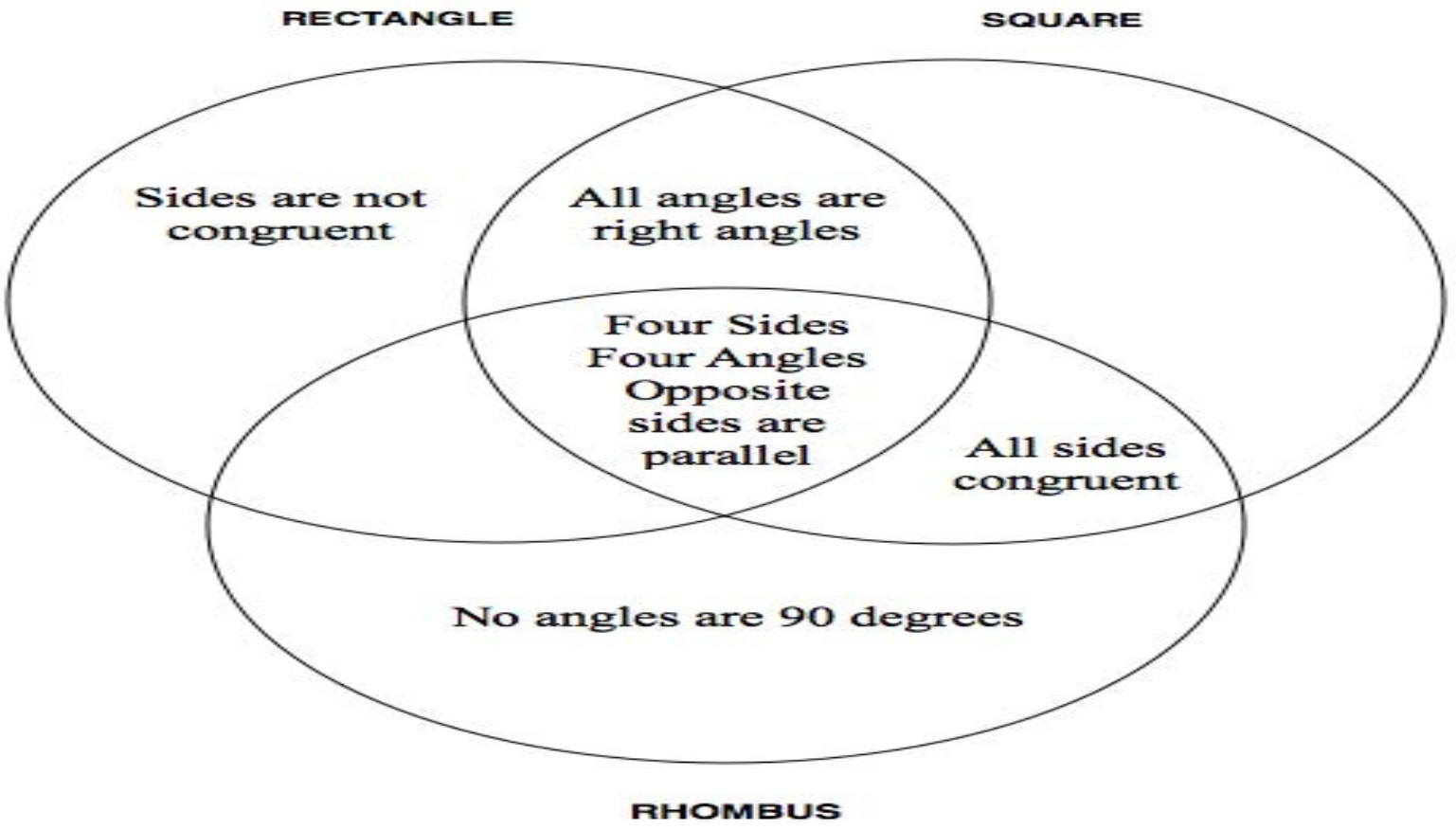
Constructing Meaning

Objectives

- Check for Understanding



Take Language Off the Map



Intermediate:

1. _____ and _____ are similar in that both _____.

Early Advanced / Advanced:

2. As opposed to _____, _____ *have / don't have*_____.

Examples

Corresponding angles:

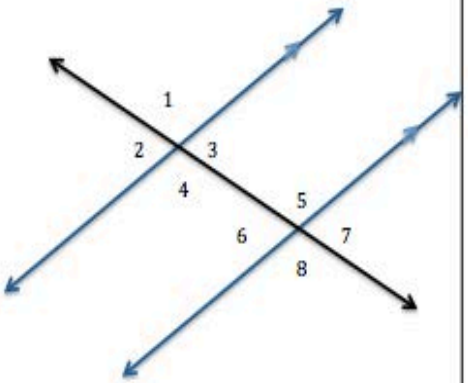
Corresponding angles are _____

Vertical angles:

Vertical angles are _____

Alternate Interior angles:

Alternate interior angles are _____



Alternate Exterior angles:

Alternate Exterior angles are _____

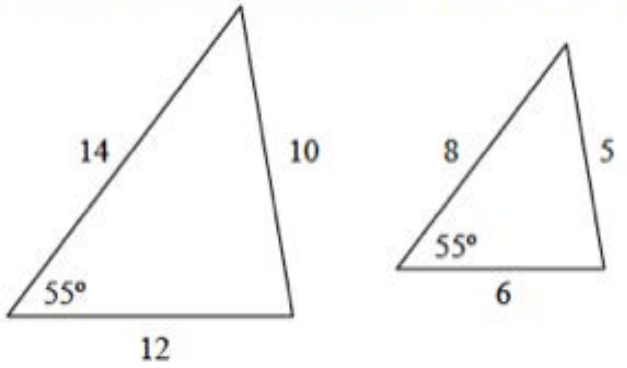
Same Side Interior (SSI):

Same side interior angles _____

Linear Pair:

A linear pair _____

Are the triangles below similar? Explain your answer.



I believe that these two triangles _____

based on the fact that _____

Further evidence can be found by _____

_____. This proves that

_____. Because they _____

_____the two criteria of similar triangles, _____

and _____.

Angle 1 and Angle 5 are equal because they are corresponding.

Student Talk

- What percentage of the school day are students engaged in academic discourse?

Research suggests as little as 2-4%

Arreaga-Mayer & Perdomo-Rivera

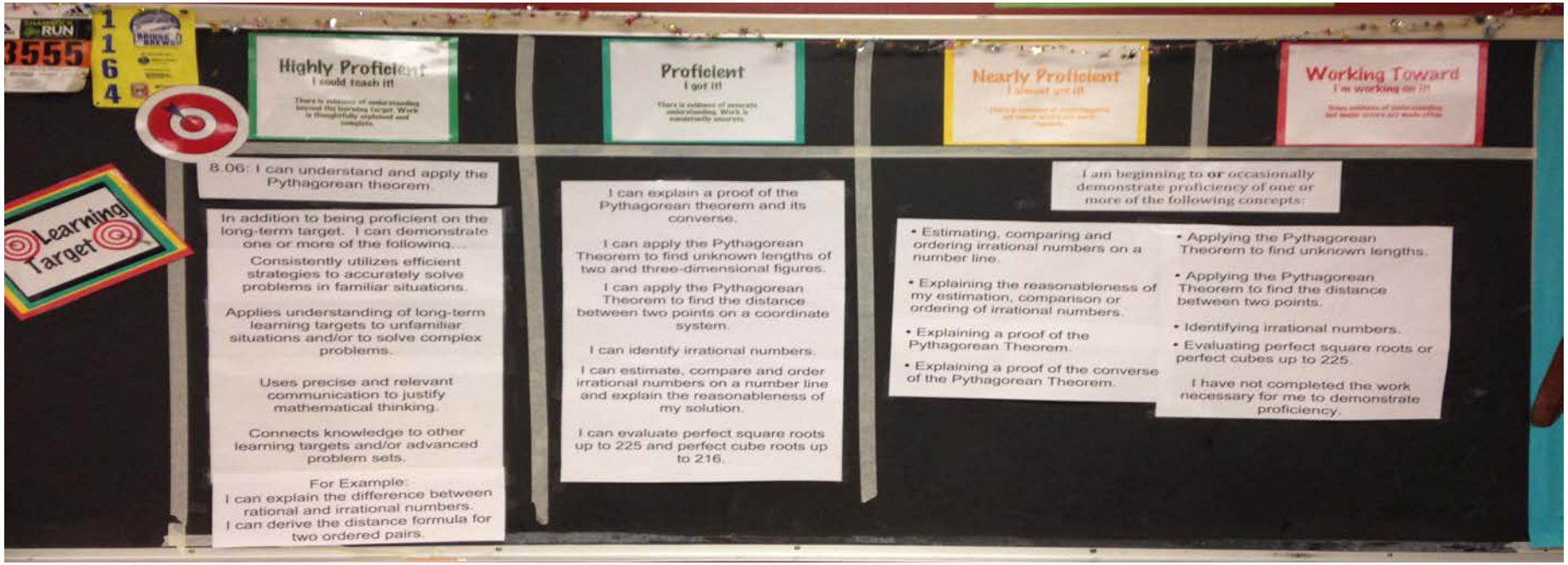
- Choral Response
- Partner Talk
- Group work
- Justify thinking
- Think-pair-share
- Sentence Frames
- Chalk Talk
- Write Around
- Stickie Notes
- Fancy Words

Rubric

Observables	Rating (1-2-3)	Comments
Teacher expectations and strategies engage students in rigorous work.	1 - 2 - 3	
Teachers uses strategies that capitalize on learning needs of students	1 - 2 - 3	
Teacher sets expectation and provides support for a variety of engagement strategies and structures that facilitate participation and meaning making by students.	1 - 2 - 3	
Students have the opportunity to engage in quality talk and student talk reflects knowledge and ways of thinking associate with content. Students provide evidence to support thinking.	1 - 2 - 3	

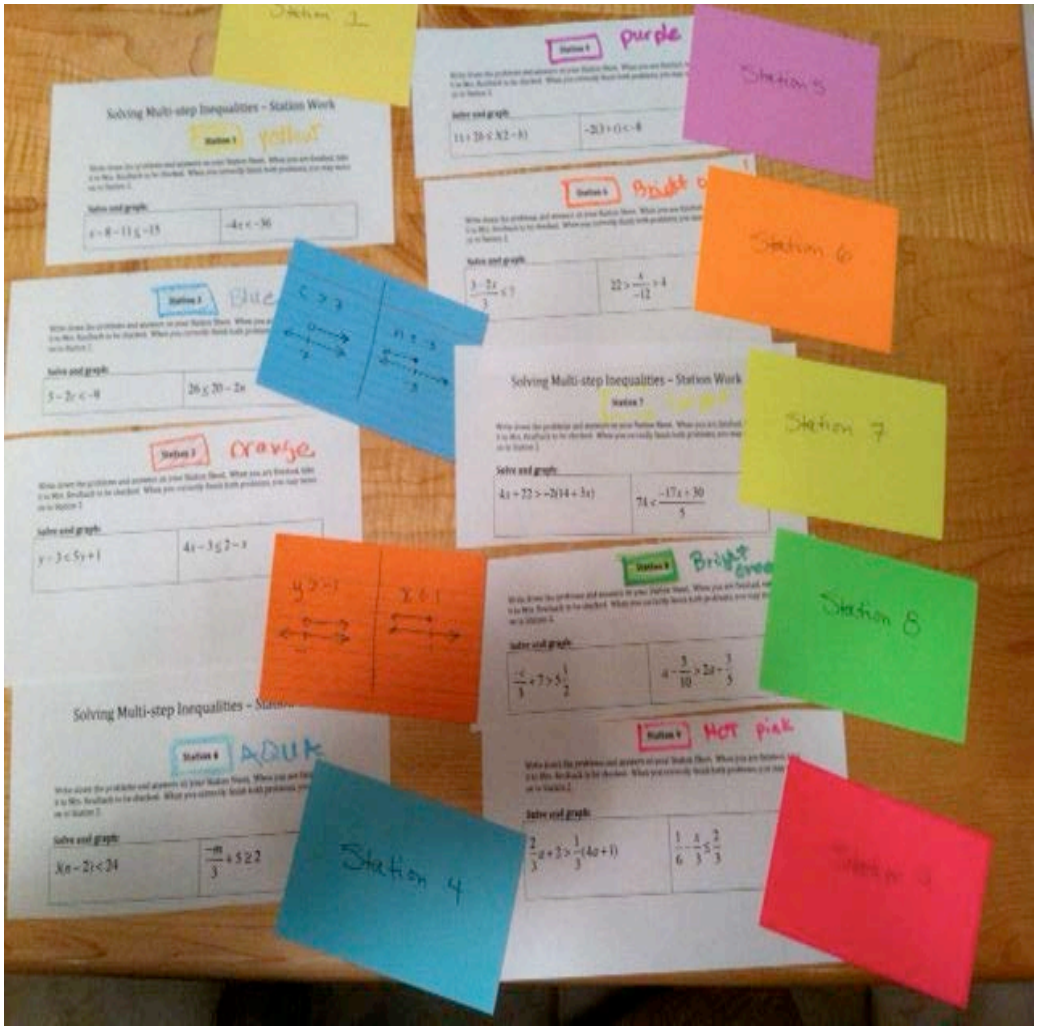
Review Rubric & Share with Partner

Evidence
In regards to _____, I believe_____ due to the fact that _____.
Further evidence of _____is when students/teacher did _____ _____.



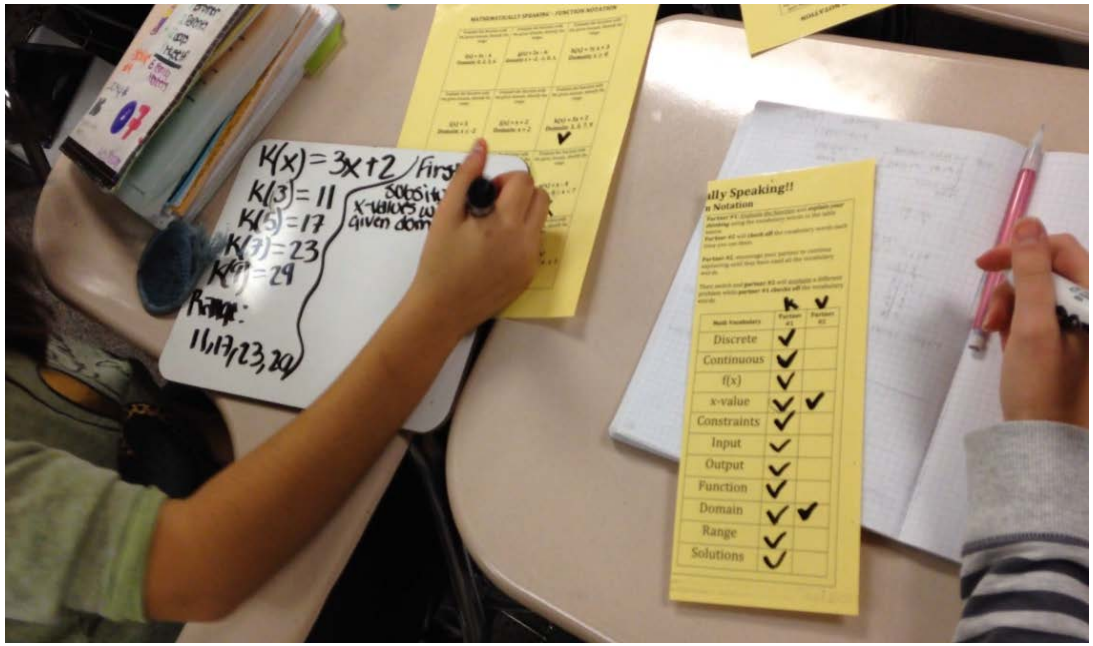
Stations

- Targeted Practice
- At Own Pace
- Immediate Feedback
- Engaging
- Ownership of Learning

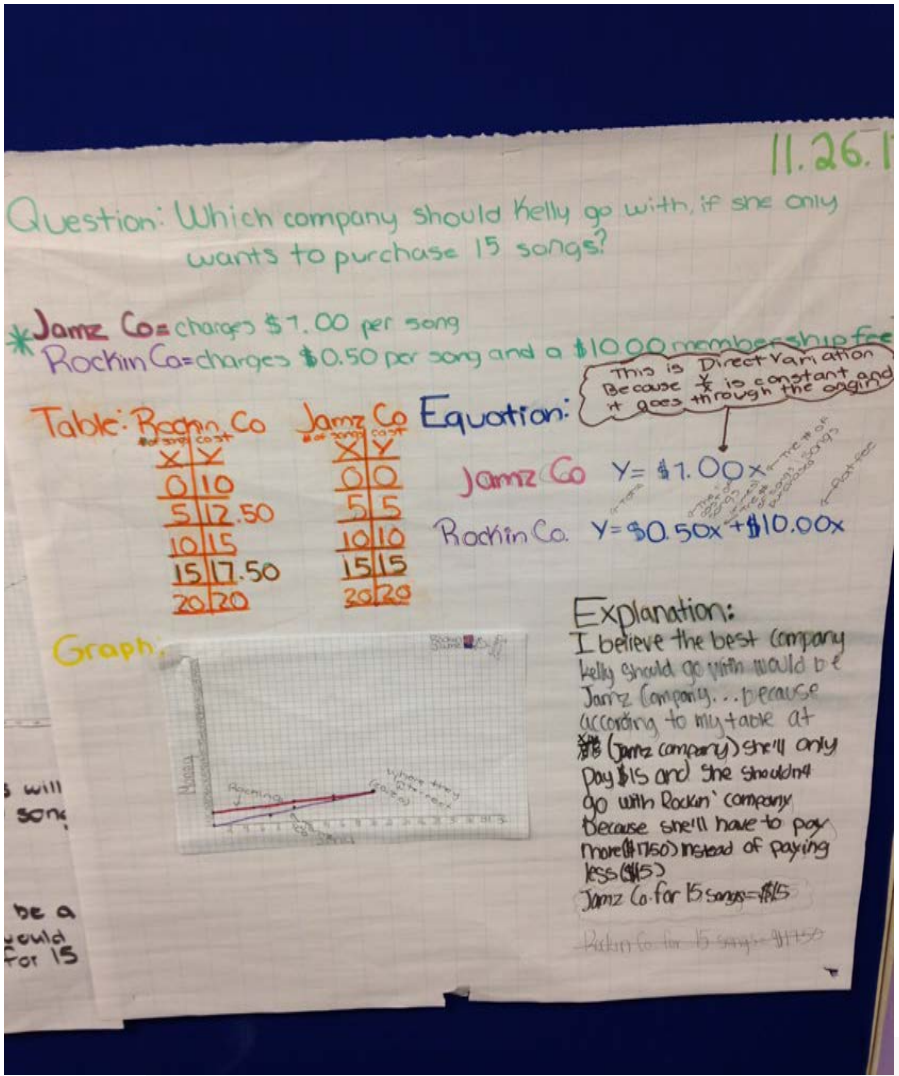


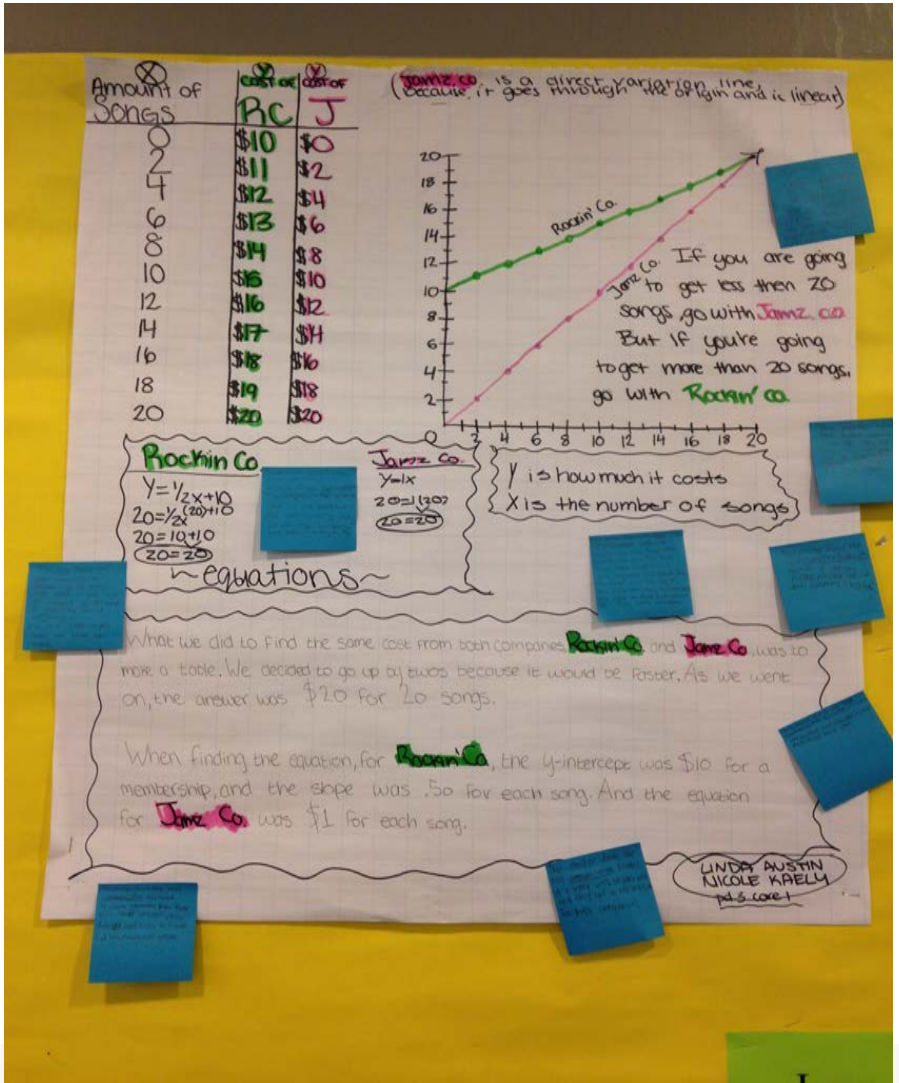
White Boards

- Quick assessment
- All participate
- Highly motivating



Practice and Application





Formative Assessment:
Thumbs Up/Down
Fist to Five

- Use throughout lesson to check for understanding
- Allows all students to respond
- Quick assessment
- Call on students to elaborate based on hand responses
- Feedback to teacher and student-Not graded

Writing Support

2. I can use a table or a graph of a linear relationship to find a solution to a problem by locating either the _____ value or the _____ value on the table or graph and looking at the number _____. In a graph you can find the second number by _____ _____. In a table you can find the second number by _____ _____.

The solution to a linear equation represents a point on a graph or in a table that includes two numbers, (,). The first number represents an _____ value and the second number represents a _____ value.

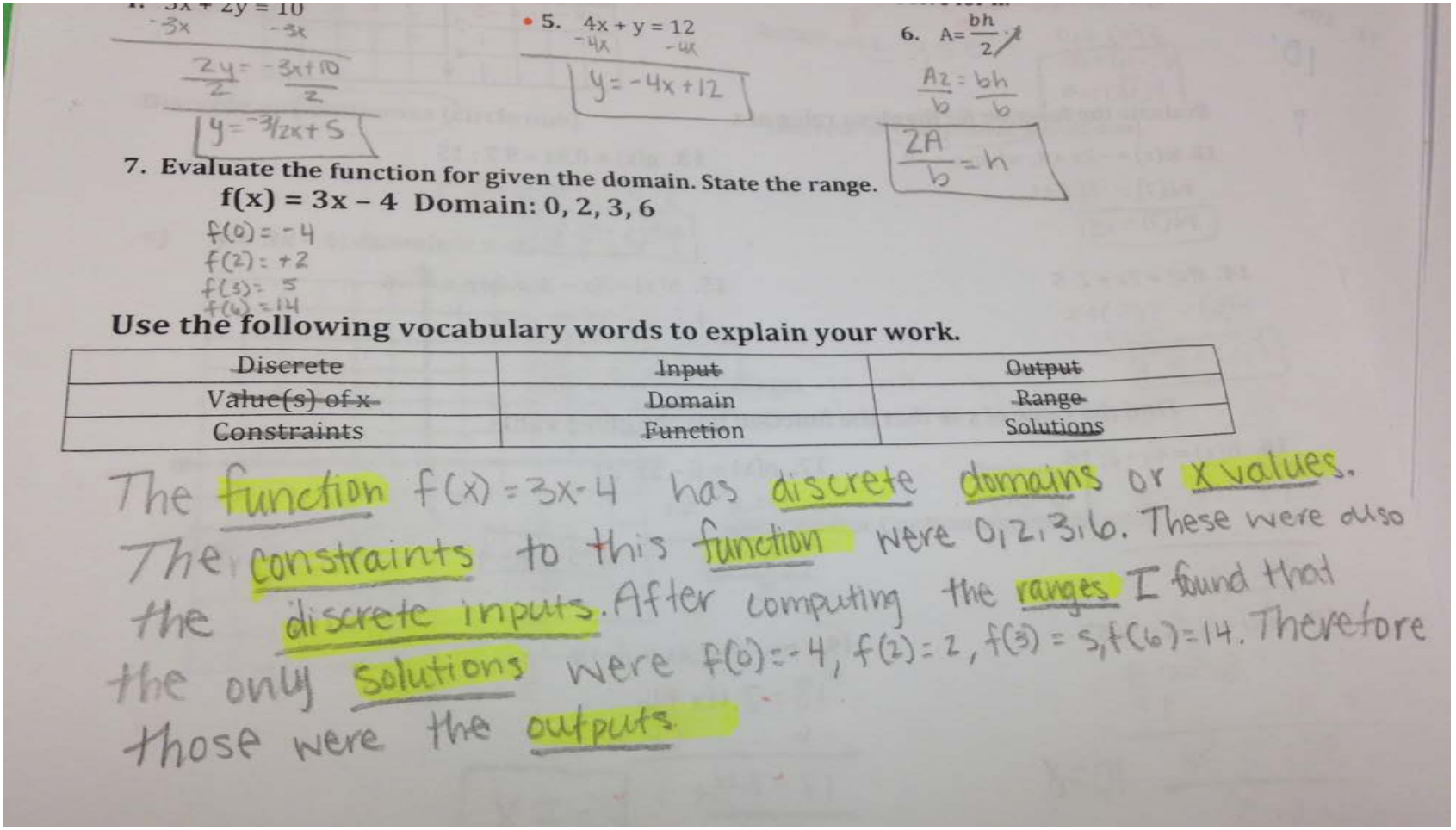
I can use an equation to solve a problem by _____ a number for one of the _____, and then _____ to find the value of the second _____.

Adapted by Jamie Cooper from Connected Math "Moving Straight Ahead" Investigation 2 Reflection.

To understand the problem, I….	❍ read for ❍ looked at ❍ thought about ❍ considered the	❑ signal words. ❑ numerical expressions. ❑ key ideas. ❑ familiar content.	_____ _____ _____ _____

Constructing Meaning

Writing Support



$-3x \quad -3x$

$\frac{2y}{2} = \frac{-3x+10}{2}$

$y = -\frac{3}{2}x + 5$

5. $4x + y = 12$

$-4x \quad -4x$

$y = -4x + 12$

6. $A = \frac{bh}{2}$

$\frac{A2}{b} = \frac{bh}{b}$

$\frac{2A}{b} = h$

7. **Evaluate the function for given the domain. State the range.**

$f(x) = 3x - 4$ Domain: 0, 2, 3, 6

$f(0) = -4$

$f(2) = +2$

$f(3) = 5$

$f(6) = 14$

Use the following vocabulary words to explain your work.

~~Discrete~~	~~Input~~	~~Output~~
~~Value(s) of x~~	~~Domain~~	~~Range~~
~~Constraints~~	~~Function~~	~~Solutions~~

The function $f(x) = 3x - 4$ has discrete domains or x values. The constraints to this function were 0, 2, 3, 6. These were also the discrete inputs. After computing the ranges I found that the only solutions were $f(0) = -4$, $f(2) = 2$, $f(3) = 5$, $f(6) = 14$. Therefore those were the outputs.

Feedback

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