

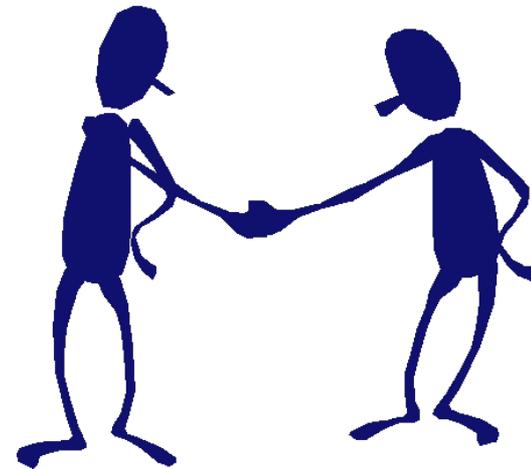
Partner Up Mathematical Writers! Exploring the Shared Writing Frame

Shared Writing Frame

Name _____ Partner _____

Question:

My Mathematical Idea:	My Partner's Mathematical Idea:

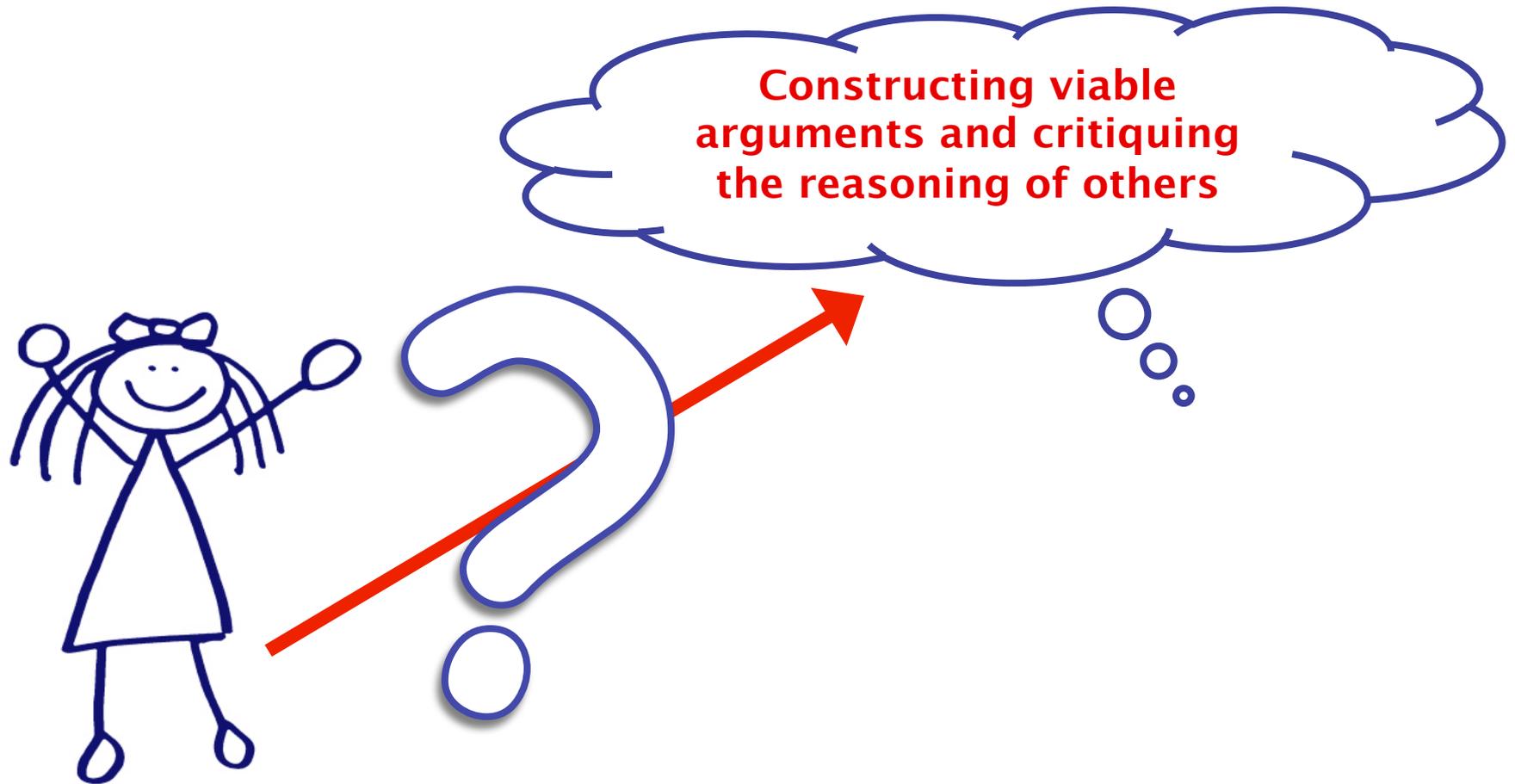


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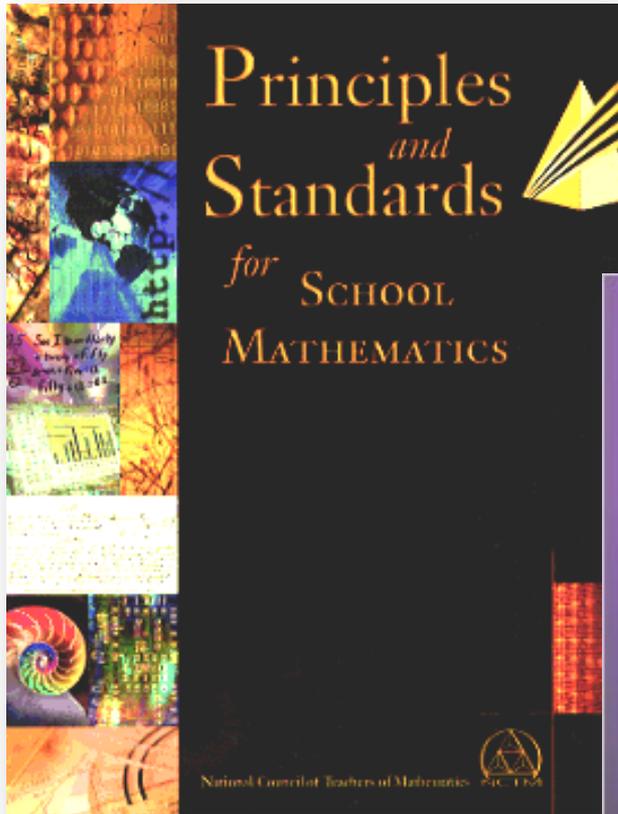
Graphic Organizers

- Turn to someone near you and share the purpose for why you would use a graphic organizer.

The Question



Looking for Guidance



Mathematical Practice 3

Construct viable arguments and critique the reasoning of others.

- “Students at all grades can **listen or read** the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments” (p. 7, emphasis added)



CCSS–ELA

K–5 Writing Anchor Standard

Range of Writing:

“Write routinely...for a range of tasks, purposes, and audiences” (p. 18)



Common Core State Standards

- **Writing**

- **Argumentative/Opinion**

Write “to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence” (p.18)

- **Informative/Explanatory**

Write “to examine and convey complex ideas and information clearly and accurately” (p. 18)

- **Narrative**

Mathematical Practice 3

Construct viable **arguments**
and critique the reasoning
of others.



Argumentation in CCSS

The Special Place of Argument in the Standards

While all three text types are important, the Standards put particular emphasis on students' ability to write sound arguments on substantive topics and issues, as this ability is critical to college and career readiness. English and education

Gerald Graff (2007)

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“The standards place special emphasis on writing logical arguments as a particularly important form of college- and career-ready writing.”

The unique importance of argument in college and careers is asserted eloquently by Joseph M. Williams and Lawrence McEnerney (n.d.) of the University of Chicago Writing Program. As part of their attempt to explain to new college students the major differences between good high school and college writing, Wil-

“Argument” and “Persuasion”

riters employ a s. One common dibility, char- (or speaker). y are knowl- ences are say. Another self-interest, ny of which argument, on dience be- l reasonable- ered rather ing evokes in ter of credentials of the writer. The Standards place special emphasis on writing logical arguments as a particularly important form of college- and career-ready writing.

Reading

Science

Math

History

Writing

Argumentation

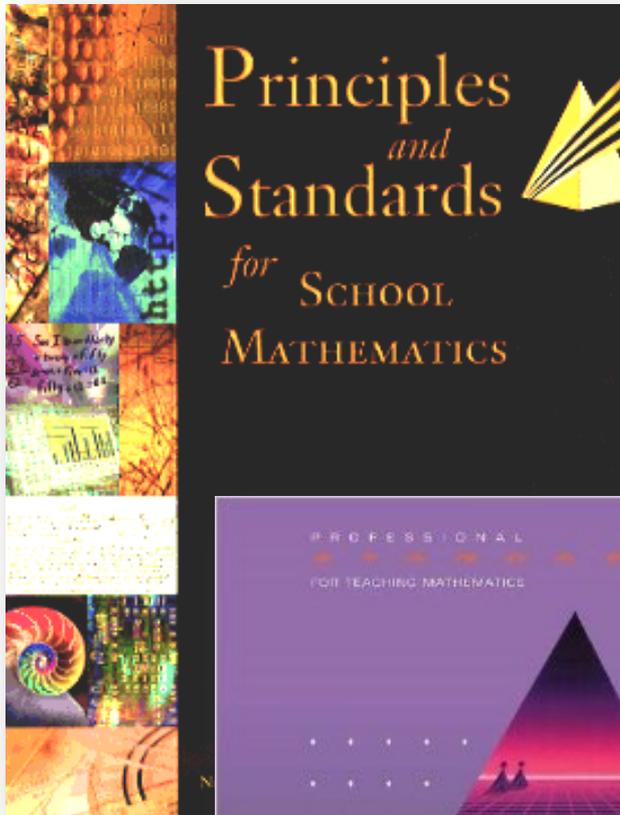
Communicate by “constructing viable arguments, critiquing the reasoning of others, and/or attending to precision when making mathematical statements” (2014, p. 1).



Partnership for Assessment of
Readiness for College and Careers

“Clearly and **precisely** construct viable **arguments**, to support their own **reasoning** and to **critique the reasoning** of others” (2012, p. 1).





***“communication is an essential part of mathematics and mathematics education”
(NCT2000, p. 60)***

Writing is mentioned but paid cursory attention.



“Mathematical discourse includes the purposeful exchange of ideas through classroom discussion, as well as through other forms of verbal, visual, and written communication.”

(NCTM Principles to Actions, 2013, p. 29)

Some Types of Mathematical “Writing”

Symbols
Graphs
Tables
Pictures
Words

Javier claims that $1/2 < 3/8$. Do you agree or disagree and why? **C**

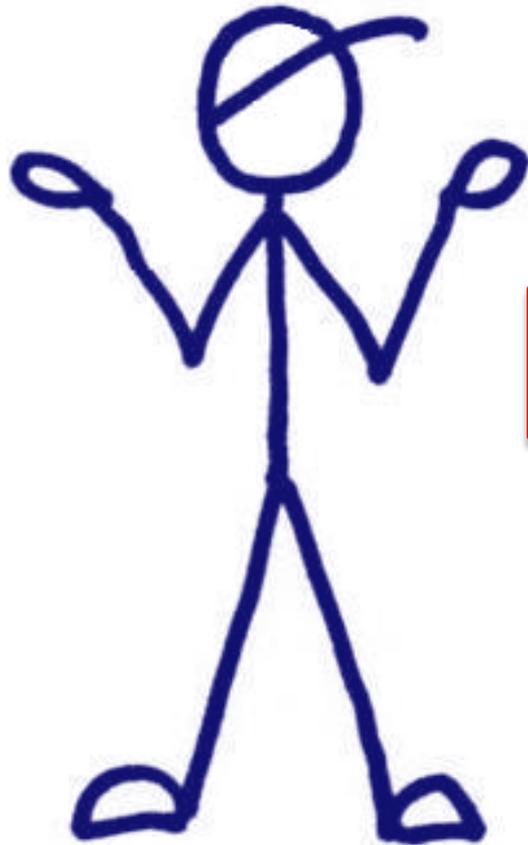
We disagree because $1/2$ is bigger than $3/8$.

Our proof is that in $1/2$ it has more shaded in than $3/8$.  $1/2$  $3/8$ In this picture you **E**

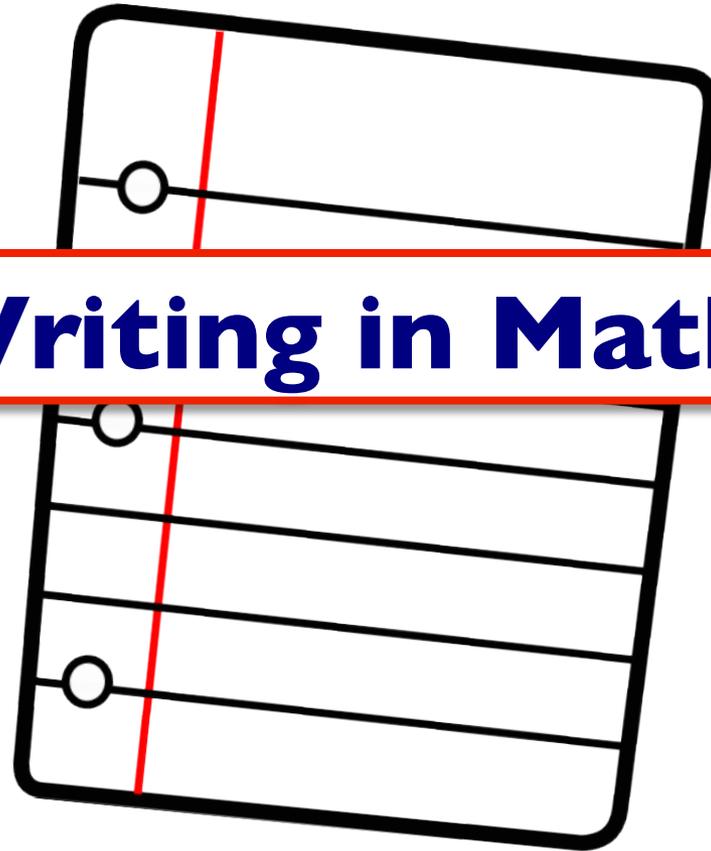
can see that one half has more shaded in than three eighths.

Another example is $1/2 =$ to four eighths and four eighths is bigger than $3/8$.   As you can see still $4/8$ or $1/2$ is bigger than $3/8$. That is why we disagree with Javier and think that $1/2 > 3/8$ **R**

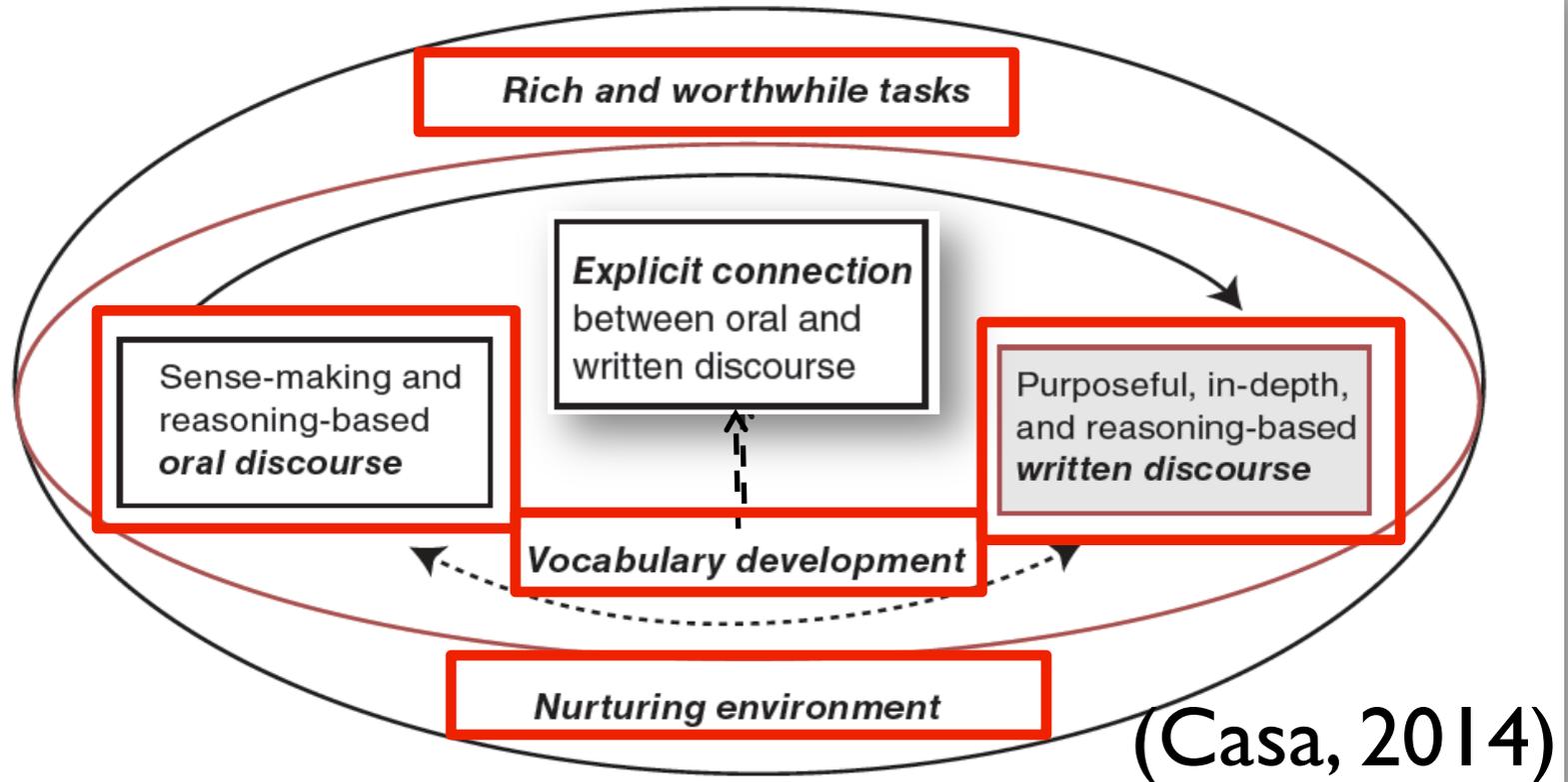
Mathematical Writing



Writing in Math?



Student Mathematician Discourse Framework

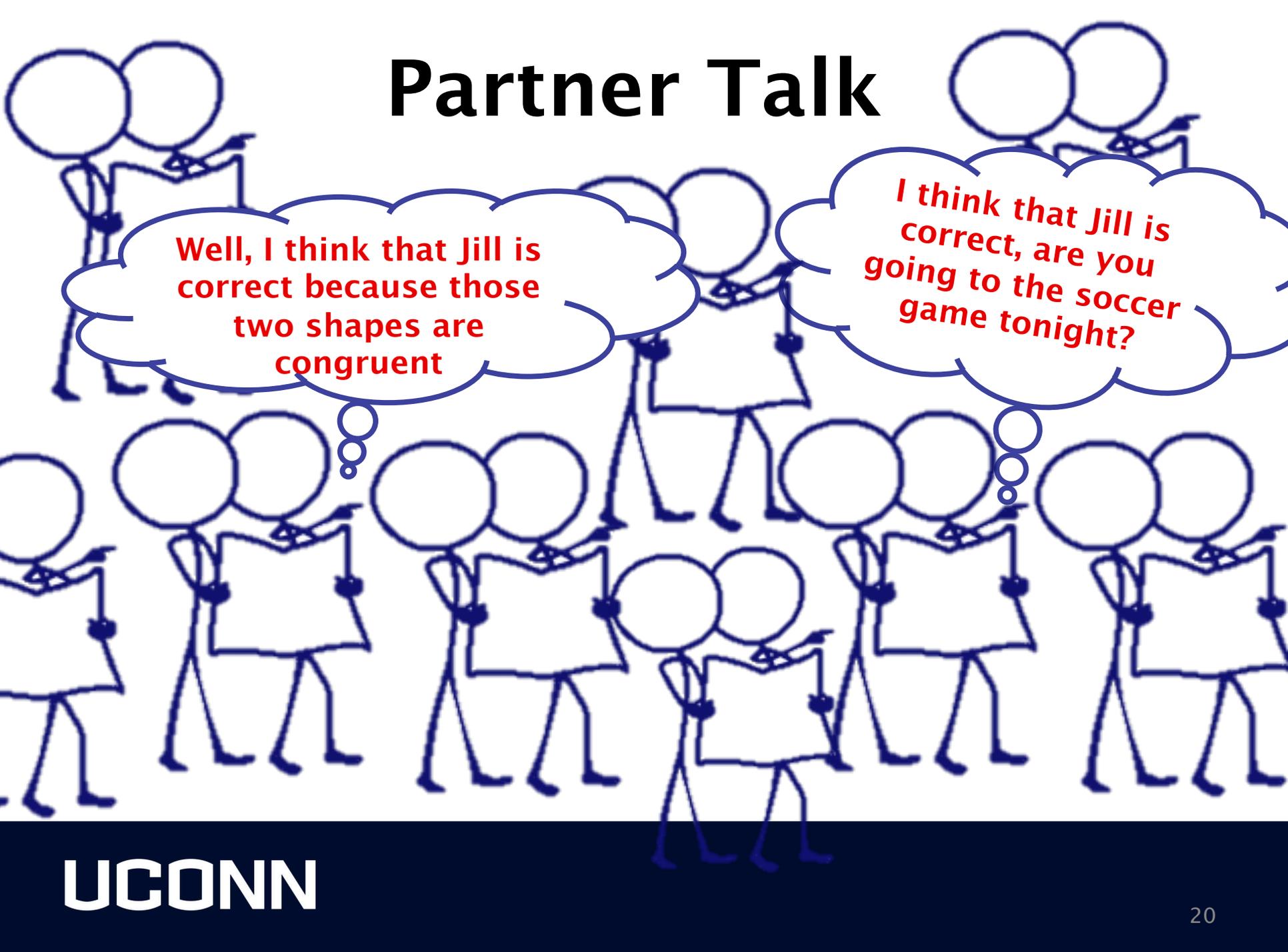


How could I leverage existing structures in my classroom to support written communication?

“Mathematical discourse includes the purposeful exchange of ideas through classroom discussion, as well as through other forms of verbal, visual, and written communication.”

(NCTM Principles to Actions, 2013, p. 29)

Partner Talk

The illustration shows a classroom of stick figures. In the foreground, several pairs of figures are holding papers and talking. Two thought bubbles are present: one on the left containing text about congruent shapes, and one on the right containing text about a soccer game. The figures are drawn in a simple, blue line-art style.

Well, I think that Jill is correct because those two shapes are congruent

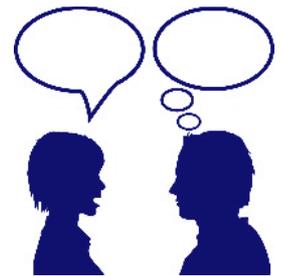
I think that Jill is correct, are you going to the soccer game tonight?

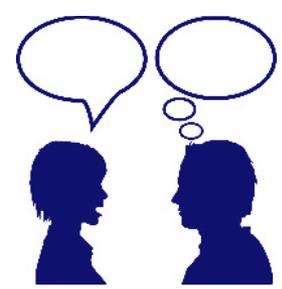
“Mathematical discourse includes the purposeful exchange of ideas through classroom discussion, as well as through other forms of verbal, visual, and written communication.”

(NCTM Principles to Actions, 2013, p. 29)

Let's try the frame out together

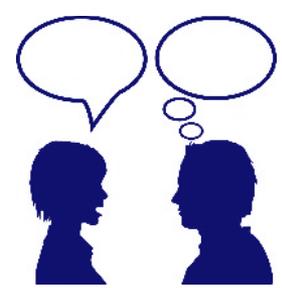
- Erik says that $1/4$ is larger than $1/3$ because 4 is greater than 3. Do you agree or disagree with Erik? Why?





Completing the Frame

<p><small>Question:</small> Erik says that $1/4$ is larger than $1/3$ because 4 is greater than 3. Do you agree or disagree with Erik? Why?</p>	
<p>My Mathematical Idea:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>My Partner's Mathematical Idea:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>



Completing the Frame

<p>From our conversation... (Check all that apply)</p> <p><input type="checkbox"/> New ideas were developed <input type="checkbox"/> We improved our ideas with our partner's help <input type="checkbox"/> Compared similarities and differences</p>	
<p>My own idea and new ideas after our conversation...</p> <hr/>	<p><u>Representation</u></p>
<p>Color code your work!</p> <ul style="list-style-type: none">✓ Underline or highlight in blue if it is your own idea✓ Underline or highlight in yellow if it was your partner's idea✓ Underline or highlight in green if it was a shared idea	



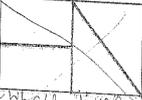
Analyzing Student Work

Math Frame with Rubric

Name _____ Partner _____

Question: Is this whole rectangle divided into equal parts?

Which of these ways shows a whole divided into six equal parts?



My Mathematical Idea:

1 2 3 4 5 6 are divided into six equal parts

Number 5 is not equal because it has seven parts. Number 6 was without the line. It is equal because when you cross it out it is equal.

My Partner's Mathematical Idea:

Shane said that it is equal because number 1 is the same area and the same shape. They are the same shape and they are equal.

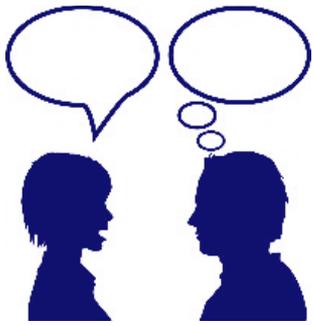
My own idea and new ideas after our conversation...

I learn that congruent is the same size same shape same area.

It made me think paper that is the same that we both said it is equal.

mine is different because I said it was not equal because I said it is equal.

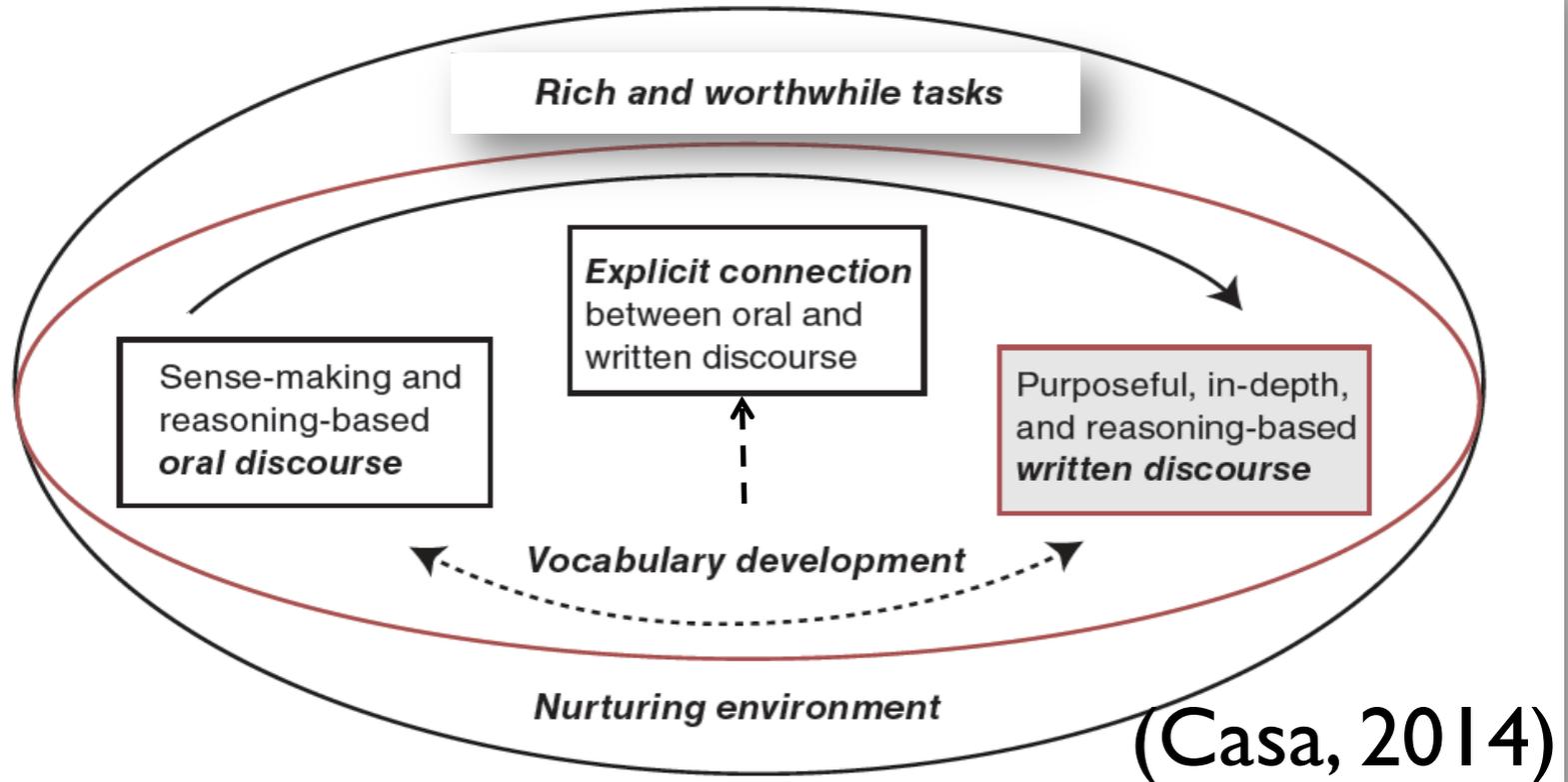
if you take the lines away it is equal.



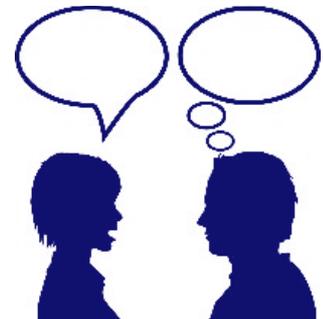
Analyzing Student Work

- What do you notice about some of the qualities of mathematical writing?
- How do you see the shared writing frame supporting student thinking?

Student Mathematician Discourse Framework

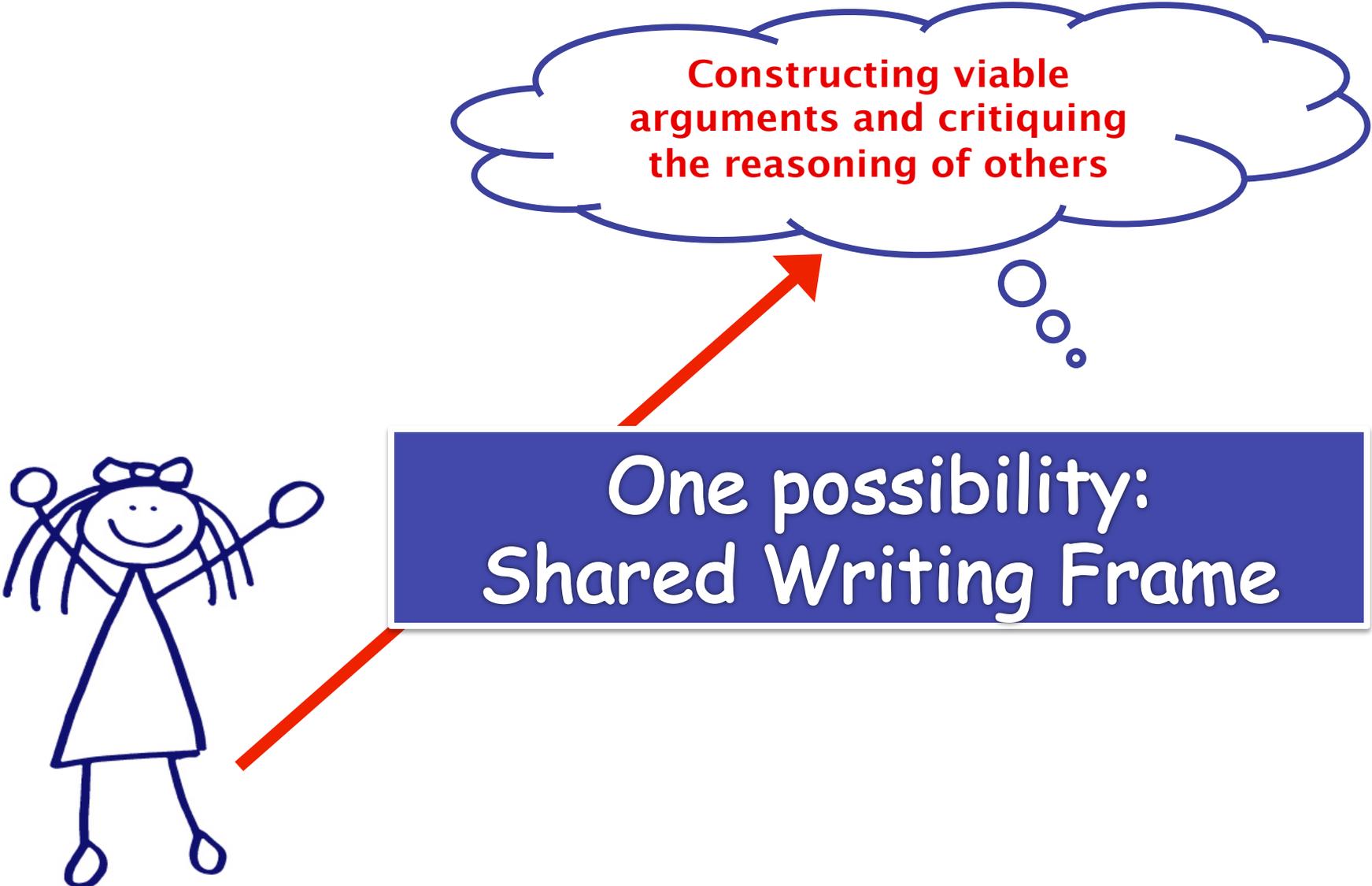


**What are some questions
you might use with the
shared writing frame in
your own classroom?**

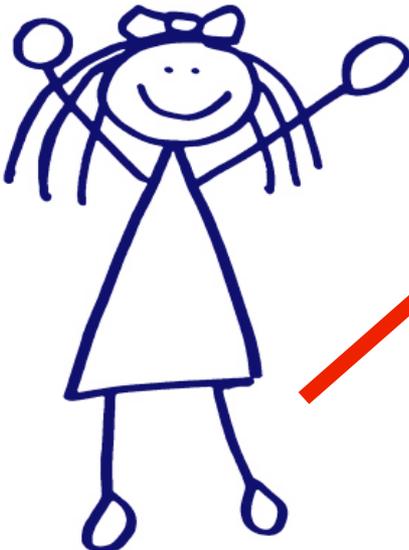


Things to consider when forming a question

- Different forms of evidence can be used to answer the question
- The question allows for multiple solution pathways
- Is something students will debate (e.g., a common misconception)



Constructing viable arguments and critiquing the reasoning of others



One possibility:
Shared Writing Frame

Shared Writing Frame

Shared Writing Frame

Name _____ Partner _____

Question:

My Mathematical Idea:

My Partner's Mathematical Idea:

our conversation... (Check all that apply)

our ideas with our partner's help Compared similarities and differences

Representation

Color code your work!

- ✓ Underline or highlight in blue if it is your own idea
- ✓ Underline or highlight in yellow if it was your partner's idea
- ✓ Underline or highlight in green if it was a shared idea



Writing in Mathematics

School Year



Construct Viable Arguments and Critique the Reasoning of others

Establish Norms:
Speaker/Listener Roles
Partner Talk
Writing

Have students start writing.

Have students share their reasoning.

Other considerations?

Writing

School Year



Construct Viable Arguments and Critique
the Reasoning of others

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Speaker/Listener Roles
Partner Talk
Writing

Have students start
writing.

Have students sharing
their reasoning.

Other
considerations?

Thank you!

Madelyn Williams Colonnese

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