



# Supporting ELs with Explaining their Mathematical Thinking

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# Why are language supports needed?



# Learner-Centered Problem:

English learners in the math classroom struggle to verbalize/write their reasoning and justifications for math solutions.

# Problem of Practice:

Math teachers may be unsure of how to scaffold oral or written reasoning for ELs, or unaware that scaffolds are needed.



# Session Objective:

Participants will plan language supports to encourage comprehensible input and output in math reasoning activities.

# Language Objective:

Participants will write response frames for open-ended math questions.



# Strategies to Support ELs with verbally explaining their math reasoning:

- Share with a small group instead of with whole class
- Provide sentence starters and/or word bank
- Ask student to write answer, *use translation software* before sharing out loud
- Use bilingual peers to help them plan their response in English
- Draw a labeled picture, show calculations instead of verbally explaining (if very limited English proficiency)
- And more!



## Strategies to Support ELs with explaining their math reasoning in writing:

- Allow use of word-to-word dictionary.
- Allow students to draw a labeled picture, graph or diagram to demonstrate their thinking (for all or part of a response)
- Include a word bank of suggested words to include in a written response.
- Provide sentence frames/starters to structure a written response.
- Conduct multiple think-alouds in which you model how to use your written calculations to inspire your written explanation.



# Designing Language Supports:

- 1) Draft an exemplar response in student-friendly language
- 2) Determine vocabulary/phrases that are crucial to a complete, correct response for potential use in a word bank or cloze sentence
- 3) Create sentence frames that:
  - a) Use an economy of words
  - b) Use simple tense
  - c) Are straightforward, without lots of clauses, passive voice, etc
  - d) Do not reveal any answers to the student



# Worth mentioning...

- Over the course of a unit, the school year, a trimester, etc you might scaffold the level of support you provide students in explaining their mathematical thinking
  - In September, you might give them a nice, sturdy response frame, but by May they may only receive a word bank, or one sentence frame, not many.
- **Different ELLs need different supports!**
  - A student who just moved here from Vietnam will need more support than a student who has lived here for three years.
- You may also need to clarify words or phrases in the word problem itself.
  - “The better buy” “roughly” “steady” etc

# Practice Creating Language Supports:

Rashanda claims that she plays roughly 30 hours of golf per week. She played 3 hours on Monday, 9 hours total on Tuesday through Thursday, and 15 hours total over the next five days. Rashanda plays at a steady rate. Explain why her claim is or is not accurate. 7.RP.3

**CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others...and respond to the arguments of others...**

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# Practice Creating Language Supports:

A vehicle moving at a constant speed travels 45 miles in  $\frac{3}{4}$  hour. The driver thinks he will be late to a meeting that is still 65 miles away and that starts in 1.25 hours. Assume he maintains a constant speed. Find the driver's unit rate of speed and explain if he was late or not. 7.RP.1

**CCSS.MATH.PRACTICE.MP3 They make conjectures and build a logical progression of statements to explore the truth of their conjectures...**

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# Practice Creating Language Supports:

Makayla wants to buy a carton of juice. She could buy a 48-ounce container for \$2.88 or a 64-ounce container for \$3.52. 6.RP.2

**Part A:** What is the cost per ounce of the juice in the 48-ounce container?

**Part B:** What is the cost per ounce of the juice in the 64-ounce container?

**Part C:** Which container is the better buy? Justify your response.

**CCSS.MATH.PRACTICE.MP3**

**Construct viable arguments...They justify their conclusions, communicate them to others,**

# Session Objective:

Participants planned language supports to encourage comprehensible input and output in math reasoning activities.

# Language Objective:

Participants wrote response frames for open-ended math questions.



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