Planning Tool: Considerations for Developing the Language of Mathematics for English Language Learners (ELLs)

~ Identifying Potential Linguistic Challenges   ~ Determining Language Goals   ~ Integrating Language Development Supports

Part 1. Essential Questions for Planning and Preparation

Math Lens	• *What is/are the **mathematical goal/s** for this unit/lesson? What MCCR **Standards** will they target?* • *What **mathematical concept** is being developed/reinforced during this unit? What other concept/s is it built on or connected to?* • *What **meaningful mathematical tasks** will help students to develop and/or reinforce conceptual understanding and skills?* • *What is the **purpose of the classroom discourse/discussion** that follows the mathematical task?*
Language Lens	• *What **language – vocabulary, grammar features, and language structures** – will students need to understand and use when engaging in tasks, communicating ideas, and demonstrating understanding?* • *What are the **language learning goals** as based on linguistic challenges of concept-related vocabulary and/or classroom discourse/discussion around the concept?* • *What **language development supports** will be implemented to advance English learners' comprehension and communication skills?*

Part 2. Anticipating Potential Linguistic Challenges of Concept-Related Vocabulary

	Guiding Questions To Ask Yourself	**Notes**	**Language Development Supports**
Concept: _____	Are ELLs <u>familiar</u> with this concept in real life? What essential **mathematical term/s** is/are related to this concept? What **culturally relevant real life examples** will help ELLs of all proficiency levels to access the tasks in order to explore the concept and develop <u>concept-related vocabulary</u>? Are any new math terms of Greek or Latin origin and therefore, might have a <u>cognate</u>? How can the meanings be eventually transferred to English? How might this new mathematical term (for this concept) be related to other words already <u>familiar</u> to students? What other familiar mathematical terms will students be expected to use? Could any math terms be confusing for ELLs because they have corresponding <u>homophones</u> and/or <u>different meanings</u> in contexts other than mathematics? Could a new mathematical term be difficult because it is represented by a <u>combination of words</u> such as *GCF (the greatest common factor)?* Could <u>pronunciation</u> of some math terms be difficult for ELLs? What **basic words associated with this concept** will ELLs need to understand and use when developing conceptual understanding? What **grammar features** are embedded within mathematical terms and/or basic words related to the concept? Might any grammar features require explicit instruction? What **operations** are students expected to use in relation to this concept? Therefore, what <u>operation-related mathematical terms and basic words/phrases</u> will students need to understand when developing procedural fluency and application of skills around the concept? What **language supports** – *sensory, graphic, interactive, verbal, textual-* might be necessary to help ELLs of all language proficiency levels to understand and use vocabulary related to the concept and operations?		

Part 3. Anticipating Potential Linguistic Challenges Related to Mathematical Discussions and Tasks

	Guiding Questions To Ask Yourself	**Notes**	**Language Development Supports**
Meaningful Task/s and Purposeful Discussion/s	What is the **purpose for the discussion/discourse** as a result of the mathematical task/s? What <u>cognitive and therefore, language functions</u> are embedded in the discourse? Please select from the sample list below. ___ Identify ___ Reason ____ Define ___ Describe ___ Justify ____ Argue ___ Compare/Contrast ___ Evaluate What would **exemplar responses** sound/look like? What linguistic challenges might ELLs experience when listening to and constructing such responses? What **academic* vocabulary, language structures, and grammar features** will ELLs need to understand and use? What **grammar features and language structures** are embedded in language functions of the mathematical discourse/tasks? What **conjunctions (connecting and transition words)** might require prior introduction and/or explicit instruction to help ELLs to bridge ideas within a sentence AND/OR to link multiple sentences in order to construct logically organized extended responses. (Please see the example below to support the above-mentioned questions.) What **engagement prompts and starters** might be integrated to support participation of ELLs of all proficiency levels during the task and discourse? What **language supports** - *sensory, graphic, interactive, verbal, textual* - are to be prepared and implemented to make the task accessible and discourse comprehensible for ELLs of all language proficiency levels? *academic words are generally the words used across content areas **Example:** *Mathematical Task: Determining and comparing-contrasting the areas of two rectangular figures.* The discourse is built around discussing different strategies for finding areas and then comparing/contrasting the areas. Firstly, in addition to concept-related vocabulary such as *area, square units, rectangles* students might need to know and use academic words related to the language function of comparing-contrasting such as *the same, similar, both, similarly, similarities, different, differences, differ/s.* Secondly, as far as grammar features, compare-contrast language function requires the use of comparatives (*larger, bigger, more, less, smaller, fewer*) and superlatives (*largest, biggest, most, least, fewest*). When constructing extended responses, ELLs might need help using conjunctions such as *both, similarly, although, even though, however, nevertheless.* Therefore, an integration and explicit instruction of sentence frames such as *Similarly to _____, _____. Even though _____, _____.* might be necessary.		

Part 4. Determining Language Goal/s and Supports

What specific linguistic challenge/s must be targeted as the language learning goal/s for this unit/lesson? What specific language development supports will be integrated to build and advance ELLs' comprehension and communication during different stages of the unit/lesson?

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Language Development Supports For English Language Learners
To Increase Comprehension and Communication Skills

Environment	
- Welcoming & stress-free - Respectful of diversity - High expectations - Structures & routines - Thinking-focused (vs. answer-seeking) discourse - Checks for understanding through multiple modalities - Explicit instruction of specific language targets - Participation and engagement techniques - Meaningful integration of games and learning centers	- Opportunities to apply knowledge and create problems or representation to further thinking - Task/Activity: - Accessible by all students - Multiple entry points - Relevant to students' life experiences and culture - Built on prior mathematical learning - High cognitive demand - Multiple strategies for solutions

Sensory Supports*	Graphic Supports*	Interactive Supports*	Verbal and Textual Supports
- Real-life objects (realia) or concrete objects - Physical models - Manipulatives - Pictures & photographs - Visual representations or models such as diagrams or drawings - Videos & films - Newspapers or magazines - Gestures - Total Physical Response (TPR) - Physical movements - Music & songs	- Graphs - Charts - Timelines - Number lines - Graphic organizers - Graphing paper	- In a whole group - In a small group - In pairs as a group (first, two pairs work independently, then they form a group of four) - With a partner such as *Turn-and-Talk* - In triads, for ex. *Problem-Solution Triads* - Cooperative learning structures such as *Think-Pair-Share Timed Pair Share, Rally Coach, Numbered Heads Together* - Interactive websites or software - With a mentor or coach	- Labeling - Use of students' native language - Modeling - Repetitions - Paraphrasing - Summarizing - Guiding questions - Clarifying questions - Probing questions - Leveled questions such as What? When? How? Why? - Questioning prompts & cues - Word Banks - Sentence starters - Sentence frames - Discussion frames - Accountable Talk moves, including *Wait Time*