

Why would you need a vocabulary list for Accelerated Math?

As children progress through school, they focus less on gaining the tools of learning (literacy, numeracy) and more on gaining academic knowledge itself. Each school year the emphasis on academic material increases. Success with this material requires—from all learners—a deep understanding of content area and academic vocabulary. This vocabulary includes the specific language associated with each academic subject and the abstract and specialized language used in academic discourse and instruction. Without this critical understanding, important concepts become inaccessible to students. All students, to one degree or another, need to be explicitly taught this vocabulary. This is especially true in cases where words that have one meaning in common parlance have a different meaning in more specific or technical contexts.

For students who are learning English, this vocabulary can present a particular challenge. Not only do these students need to acquire basic literacy and numeracy skills (as do their native-speaking counterparts) but they must also master the language of instruction itself. There is a direct relationship between language proficiency and academic achievement. Certainly it is not the only factor affecting achievement, but for many English Language Learners (ELLs) it is a critical one. As one author expressed it: “for ELLs, every test is a test of language proficiency.” (Solórzano, R., 2009)

As is the case in other disciplines, the language used in math problems can be a barrier to success, no matter what level of mathematics understanding students may have. Teachers give instruction in mathematical concepts and carry out math procedures using language. Instructions in texts and story problems require language proficiency to understand. Specialized math terms must be learned, and many common words often have different usages in math. So math presents a similar challenge to other subject areas; students must learn the specific vocabulary and expressions of the discipline in order to be able to do well in it. The written text in math problems—most especially in story problems—requires students to use language in sophisticated ways compared to those expressed solely in numbers.

After an extensive review of the literature on teaching math to ELLs, Francis, et al. (2006) concluded:

Academic language is as central to mathematics as it is to other academic areas. It is a significant source of difficulty for many ELLs who struggle with mathematics.... [T]he oral and written language of mathematics—or the mathematics register—should be ... explicitly integrated into the curriculum.

Research tells us that unless students know 90-98% of words in a text they will not be able to guess the meaning of unknown words from the context. In addition, many specialized terms or obscure vocabulary won't make sense, even in context, and must be explicitly taught. For example, if we remove the words ELLs are most likely not to know (low frequency words), see how much harder the math problem becomes.

Austin buys 9 bolts and he buys 9 washers to place onto the bolts. He puts the washers he bought in a stack that has a height of 1.476 inches. How thick is each washer?

xxxxx buys 9 xxxxx and he buys 9 xxxxxxxx to place onto the xxxxx. He puts the xxxxxxxx he bought in a xxxxx that has a xxxxx of 1.476 inches. How xxxxx is each xxxxxxxx?

To address this issue in your classroom, we know you have a variety of tools and resources available to you. Word lists such as the Dolch, Fry, and General Service Vocabulary lists are excellent resources that are commonly used. You also teach and model mathematics vocabulary for students as you give them instruction. Accelerated Math (AM) Enterprise users already have available to them the Math Glossary which defines many math terms. Another Renaissance classroom tool is English in a Flash (EIAF), a language acquisition product. Students who use EIAF have a good grounding in several thousand words of both social and academic vocabulary. This academic vocabulary includes the basic mathematics terms that students need in order to function in the classroom.

AM Second Edition libraries now include an additional resource for helping ELLs and students with limited vocabulary: the Accelerated Math Vocabulary Word Lists. The purpose of this resource is not to duplicate what you already have or what you already do, but rather to fill in any vocabulary gaps that may impede understanding. For each grade level library, Accelerated Math includes a list of the nonmath words used in the math problems that are not taught in EIAF. Each word on the list has a simple, functional explanation using the vocabulary learned in EIAF.

When students come across an unfamiliar word in an AM problem, they can refer to the printed list of words. Explanations of words on the AM Vocabulary Word Lists are carefully written with vocabulary found in EIAF. With this clarification, students can quickly return to their math task and not get sidetracked, bogged down, or worse, misdirected because of poor understanding.

Below are a few sample explanations of words from the Accelerated Math Vocabulary Word Lists. As noted, the explanations are carefully written with vocabulary found in EIAF, so that the definitions themselves are assured to be comprehensible to students. Note that this list does not include core mathematics terms. We know that you are teaching those terms directly to your students in the classroom. The Accelerated Math Vocabulary Word Lists contain explanations of low frequency words that, while perhaps not directly related to the math task at hand, can be distracting to a student and cause confusion or misunderstanding. It also contains definitions of function words, process words, and abstract terms that are generally difficult to understand simply from context.

Some sample explanations:

| Grade Level | Vocabulary Word | Explanation |
|-------------|-----------------|--------------------------------|
| 2 | cheddar | a kind of cheese |
| 3 | canceled | called off |
| 4 | describe | to tell about something |
| 4 | finally | at the end |
| 5 | correctly | done in the right way |
| 5 | fudge | a kind of chocolate candy |
| 5 | requires | must have |
| 6 | rye | a kind of grain |
| 6 | tuna | a kind of fish |
| 6 | vegetarian | a person who does not eat meat |
| 7 | attorney | a lawyer |

AM Second Edition libraries speak to the gap in the learning process of ELLs and students with limited vocabulary, by giving students and teachers tools to assure that all the necessary content language is understood and integrated into the mathematics learning curriculum. The language becomes not a barrier to learning, but a bridge to deeper understanding of mathematical concepts and processes.