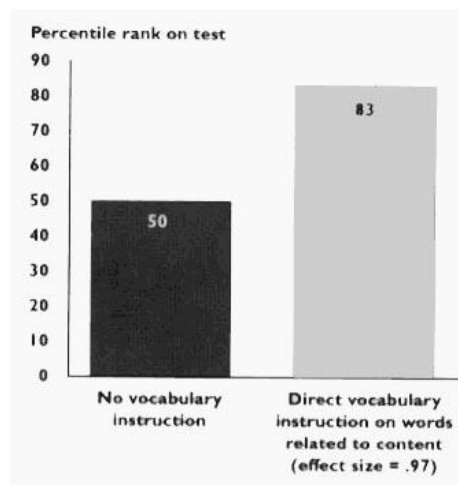


## Vocabulary in Focus

This vocabulary section is designed to help systematically enhance the academic vocabulary of students to better prepare them to learn new content in mathematics. The research and theory underlying the recommendations made here have been detailed in the book *Building Background Knowledge for Academic Achievement* (Marzano, 2004). The logic of such an endeavor is that the more general background knowledge a student has about academic content addressed in a given class or course, the easier it is for the student to understand and learn.

The bar on the left side of the graph shows a student at the 50<sup>th</sup> percentile in terms of ability to comprehend the subject matter taught in school with no direct vocabulary instruction. The bar on the right side shows the comprehension level of the same student after vocabulary terms have been taught in a specific way. The dramatic increase to 83% provides a strong argument for teaching academic vocabulary. Because of a variety of factors, there is typically great disparity in the academic background knowledge of students. This disparity increases as students progress through the school years. However, if all students were exposed to specific academic terms across the grade levels, a strong common foundation



for all students would be formed. To this end, this section lists important academic terms in mathematics. The words listed in this document are not all inclusive, but are suggested as a starting point in building the academic vocabulary for a given grade or course.

The following table provides an overview of the number of terms in each grade:

	Number of words		Number of words
<b>Grade K</b>	43	<b>Grade 6</b>	34
<b>Grade 1</b>	40	<b>Grade 7</b>	31
<b>Grade 2</b>	34	<b>Grade 8</b>	28
<b>Grade 3</b>	41	<b>Algebra I / Technical Algebra</b>	26
<b>Grade 4</b>	40	<b>Algebra II</b>	43
<b>Grade 5</b>	28	<b>Geometry / Technical Geometry</b>	28

To demonstrate the potential power of addressing common terms and phrases, there are 326 terms listed for grades K – 8. If every teacher were to teach these terms, students would enter ninth grade with common, in depth experiences with these key mathematics terms. Certainly this would provide a strong base on which ninth grade mathematics teachers could build.

## **A five-step process**

There is no single best way to teach terms and phrases. However, research and theory on vocabulary development point to a few generalizations that provide strong guidance.

### **1. Initially Provide Students with a Description, Explanation, or Example as Opposed to a Formal Definition**

When introducing a new term or phrase it is useful to avoid a formal definition at the start. Formal definitions are typically not very “learner friendly.” They make sense after there is a general understanding of a term. Provide students with a description, explanation, or example. Ask students what they already know to avoid misconceptions.

### **2. Have Students Generate Their Own Descriptions, Explanations, or Examples**

Once a description, explanation, or example has been provided to students, they should be asked to restate that information in their own words. It is important that students do not copy exactly what the teacher has offered. Student descriptions, explanations, and examples should be their own constructions using their own background knowledge and experiences to forge linkages between the new term or phrase and what they already know.

### **3. Have Students Represent Each Term or Phrase Using a Graphic Representation, Picture, or Pictograph**

Once students have generated their own description, explanation, or example they should be asked to represent the term or phrase in some graphic, picture, or pictographic form. This allows them a different, nonlinguistic way to process the information. It also provides a second processing of the information which should help deepen students’ understanding of the new term or phrase.

#### **4. Have Students Keep an Academic Vocabulary Notebook**

Over time students will develop an understanding of a set of terms and phrases that are important to the academic content in mathematics. This implies that the terms and phrases that are taught using this approach represent a related set of knowledge that expands and deepens from year to year.

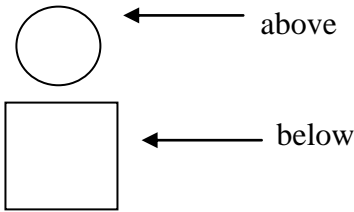


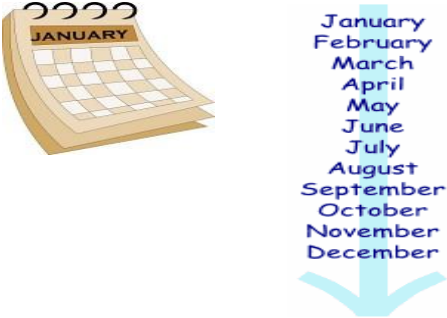


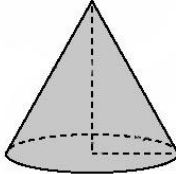
To facilitate this cumulative effect it is highly advisable for students to keep an “academic vocabulary” notebook that contains the terms and phrases that have been taught. Enough space should be provided for students to record their initial descriptions, explanations, and examples of the terms and phrases as well as their graphic representations, pictures, and pictographs.

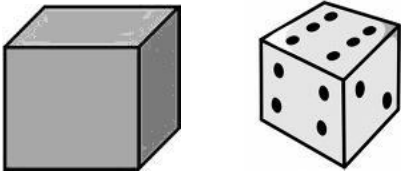
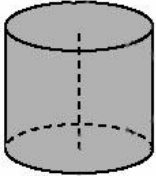

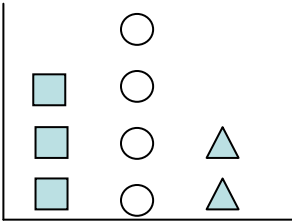

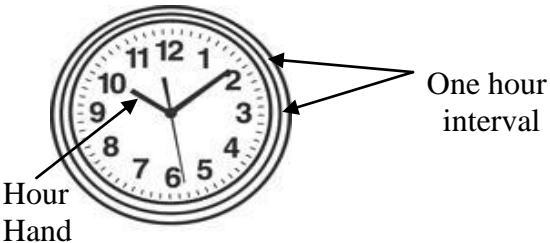
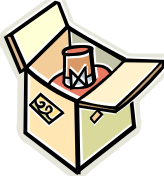
Students should be engaged in activities that allow them to review the terms in their academic vocabulary notebooks and add to their knowledge base.




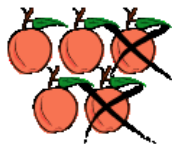




#### **5. Periodically Review the Terms and Phrases and Provide Students with Activities That Add to Their Knowledge Base**



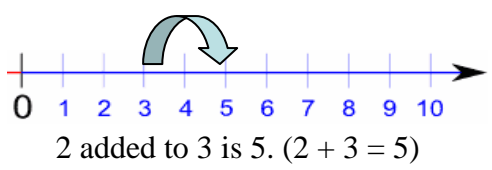

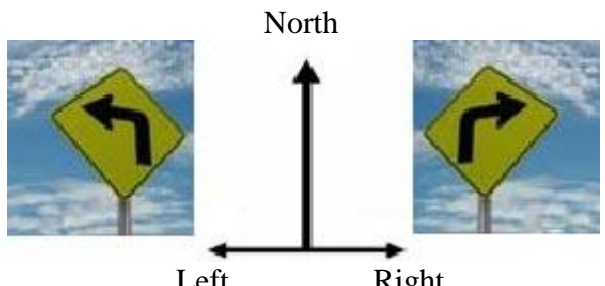
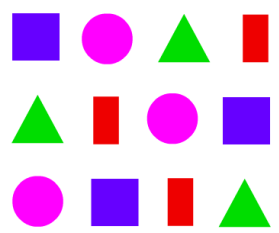
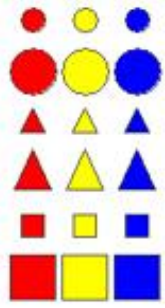
If students experience a new term or phrase once only, they will be left with their initial, partial understanding of the term or phrase. To develop deep understanding of the terms must be engaged in review activities. Offer students activities that add to their knowledge base about the terms in their notebooks. For example, they might make comparisons between selected terms; they might create analogies or metaphors for selected terms; they might simply compare their entries with those of other students. Finally, they might be engaged in games that use the terms from their academic vocabulary notebooks. After each of these activities students should be asked to make corrections, additions, and changes to the entries in their notebooks. In this way, students’ knowledge of the academic terms and phrases deepen and become a sound foundation on which to build the academic content presented in class.

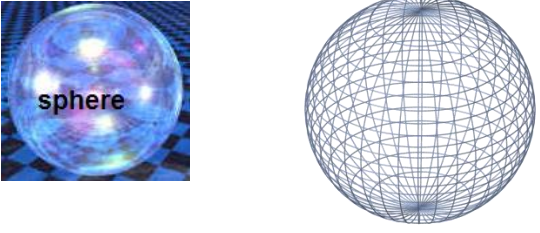









# Kindergarten


<p><b>Above:</b> A positional word indicating a location directly overhead or on top of</p> <p><b>Below:</b> A positional word indicating beneath or lower than something else</p>	<p>The circle is above the square</p>  <p>The square is below the circle</p>
<p><b>Break Apart/Take Away:</b> To remove, to subtract</p>	 $3 - 1 = 2$
<p><b>Cardinal Number:</b> A number used to name how many</p>	 <p>How many coins are there? There are five coins. Five is a cardinal number.</p>
<p><b>Calendar:</b> A chart showing the days, weeks and months of the year</p>	
<p><b>Circle:</b> A set of points, (in a plane), which are all the same distance from the center point. This distance is called the radius of the circle.</p>	
<p><b>Coin:</b> A round circular flat piece of metal used as money</p>	 <p>Coins: Penny, nickel, dime, quarter</p>
<p><b>Cone:</b> A three-dimensional shape that has a circular base, a curved surface and one vertex (called an apex).</p>	

<p><b>Cube:</b> A closed, three-dimensional figure whose six surfaces, or faces, are all squares. A cube has eight vertices and twelve edges. Six-sided number cubes are shaped like cubes.</p>	
<p><b>Cylinder:</b> A three-dimensional shape that has two parallel circular bases that are congruent and are connected by a curved surface. A can is shaped like a cylinder.</p>	
<p><b>Day/Date:</b> A phrase or number that denotes a particular day of the month</p>	
<p><b>Graph:</b> A diagram used to display data. A graph can show the relationship between two quantities.</p>	
<p><b>Hexagon:</b> A polygon with six sides</p>	
<p><b>Hour:</b> A day is divided into 24 equal parts; an hour is 60 minutes or 3600 seconds; 12 hours are shown on a clock</p>	
<p><b>Inside:</b> A positional word indicating the interior part of something, the place or part within</p>	 <p>The hat is inside the box</p>

<p><b>Left:</b> The opposite of right; west when facing north.</p>	<p>The bigger dog is on the right, the smaller dog is on the left.</p> 
<p><b>Less Than/ More Than/ Same:</b> Comparative words used to indicate a smaller amount, a larger amount or an equal amount</p>	 <p>Less than    more than    equal</p>
<p><b>Longer/ Shorter; Heavier/ Lighter; Colder/ Warmer:</b> Comparative words for length, weight and temperature</p>	 <p>longer shorter</p>
<p><b>Minus:</b> Made less by the subtraction of a number or removal of members of a set</p>	 <p><math>5 - 2 = 3</math></p>
<p><b>Number:</b> A quantity, an amount, how many in a set, a quantity that can be expressed by a numeral</p>	
<p><b>Number line:</b> A line on which every point represents a real number</p>	
<p><b>Numeral:</b> A symbol used to represent a number</p>	<p>numeral</p> <p><b>153</b></p> <p>digit    digit    digit</p>
<p><b>Ordinal number:</b> Number names that tell order or position of an object (first, second, third, etc.)</p>	
<p><b>Outside:</b> A positional word indicating the exterior part of something, the part beyond the borders.</p>	 <p>A cookie is outside the box.</p>

<p><b>Pattern:</b> A repeated design, a repeated cycle of elements. Recognizing patterns can help in making predictions.</p>	
<p><b>Position:</b> The location of somebody or something in relation to other things</p>	 <p>The fish is below the boat.</p>
<p><b>Put Together/ Count On:</b> To add by joining more to a set; putting two or more sets together, continuing to the positive direction (right) when counting on the number line</p>	
<p><b>Rectangle:</b> A parallelogram with four right angles; a square is a special rectangle with four congruent sides.</p>	
<p><b>Right:</b> The opposite of left; east when facing north.</p>	
<p><b>Shape:</b> A geometric form of an object, a figure or two-dimensional object</p>	<p>Shapes can be sorted by type, size, color, number of sides, or any common attribute.</p>  <p>other</p>
<p><b>Sort:</b> To put into groups with things having shared attributes; for example, sorting by shape, size and color</p>	 <p>These could be sorted by size, or by color, or by shape.</p>

<p><b>Sphere:</b> Circular 3-dimensional shape. All points on a sphere are the same distance from its center.</p>	
<p><b>Square:</b> A 4-sided polygon (quadrilateral) where all sides are congruent (have equal length), opposite sides are parallel, and every angle is a right angle (90°)</p>	
<p><b>Tally:</b> Marks that show how many times an item appears in a set</p>	<p>five = </p>
<p><b>Temperature:</b> A measure of how cold or hot something is.</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Hot temperature</p> </div> <div style="text-align: center;">  <p>Cold temperature</p> </div> </div>
<p><b>Thermometer:</b> An instrument for measuring temperature</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Hot temperature</p> </div> <div style="text-align: center;">  <p>Cold temperature</p> </div> </div>
<p><b>Trapezoid:</b> A quadrilateral with exactly one pair of parallel sides.</p>	
<p><b>Triangle:</b> A closed plane figure that has 3 sides and 3 angles</p>	
<p><b>Under:</b> A positional word used to express the concept of being beneath or below something, directly below or underneath something</p>	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>The books are under the apple.</p> </div> </div>

<p><b>Value:</b> How much a coin is worth.</p>	<p>1¢ is the value of the penny.</p> 
<p><b>Whole Numbers:</b> All the counting numbers and zero</p>	<p>The numbers {0, 1, 2, 3, ...}</p>
<p><b>Zero:</b> A number indicating that there is no amount; it is also used as a place holder</p>	<p>The zero in 20 means that there are 2 tens and no ones. Four minus four is zero. ( <math>4 - 4 = 0</math> )</p> 