Bringing Word Problems to Life:
Using Creation to Build a Solid Foundation

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Picture this. It's a beautiful day so you decide to take your homeschool outdoors. You head outside for a nature walk. Is this just for physical education? It doesn't have to be. No matter where you live around the globe, the study of creation provides a perfect opportunity to lay a strong foundation for solving word problems with your little ones. From counting to estimating ratios, it's easy to bring math into your conversation as you stroll along and observe the amazing complexity of nature. Let's look at some ways you can bring word-problem solving into your daily rambles.

One natural first step for your littlest one is counting. You can count everything as you go--your footsteps, rocks, flowers, bushes--make a game of it, and include categories to provide different challenge levels. For example, your youngest might count all trees while the middle child counts trees over four feet tall and your oldest counts deciduous trees over four feet tall. As you walk, count to a known rhythm, or else make up counting chants. It also is easy to introduce estimation (an invaluable tool in math) by making guesses of the total before you count.

With counting, it is easy to include real-life addition and subtraction. After something has been counted, ask how many there would be if you added 3 more. Birds make it easy to practice subtraction, because after you count them from a distance, some will usually fly off as you come near. Now you can say, "There were eight birds in that tree, but six just flew off. Now there are only two left. Eight take away six makes two." At first you can model the problem solving, but then transition to asking the child to give you the answer. It's also fun to have your child give math questions to you as you go along.

Nature is full of predictable patterns that provide a perfect way to practice skip counting or mental multiplication. Many plants have a specific number of leaves or needles clustered together. If a vine's leaves are arranged in groups of 3, you can count the groups and multiply by 3 to find the total number of individual leaves. A pine tree with needles clustered in groups of 5 provides a great way to practice counting by 5's. Most animals have two or four legs, but if you look under rocks you may find creepy-crawlies that have many more. Finding six centipedes gives an opportunity for both multiplication and estimation; you probably cannot get an exact leg count, but you could do a guess at how many legs the average centipede has, and multiply that number by six.

Mental math is a skill that is often overlooked in our age of calculators and computers-- but it is easily practiced outdoors. Children often object to doing complex calculations, so you can let them practice estimation. To illustrate, if you're looking at a bush with 32 branches, which each have 12 stems, each of which has 8 leaves, you could multiply 32 x 12 x 8 to find the total number of leaves on the bush; or, you could estimate and multiply 30 x 10 x 10. You can also make estimates of area, circumference, perimeter, or volume. For example, find a puddle of water, measure its approximate length and width, using

either a physical object like a stick or your hand, or by estimating using standard units. Then, estimate the average depth of the puddle. The volume of water in the puddle can then be determined by multiplying the length x width x depth. (Your estimate may be in units like "cubic sticks"-- and you can use this as an opportunity to talk about what cubic units are!) Be sure to use the terms "estimate", "approximately" and "about" frequently and interchangeably, as these terms are all commonly found in written word problems.

Speaking of common terms, it's important to help your child build a strong math vocabulary. If your child knows the words and can picture the situation in a written word problem, it will be much easier to solve. For your beginning students, be sure to use relational words, such as above, under, between, first, and last. For older students, incorporate terms like average, proportion, ascending, descending, accelerate, and symmetrical. Don't forget geometric terms, like area, circumference, perpendicular or horizontal. Using precise, descriptive words as you observe your surroundings will give meaning and experience to terms that are frequently used in written word problems.

Your nature walk can also be a delightful opportunity to practice fractions and percentages. For the younger ones, stick with simple amounts, like halves or thirds or quarters. By interchanging the terms "half" and 50%, or three quarters and 75% and so on, you will help your child gain an intuitive understanding of the relationship between fractions and percentages. You can say, "Hmmm, it looks like about three fourths of the trees have lost their leaves already; only 25% more to go." As your children gain proficiency, you can calculate actual percentages or estimate with fifths, sixths, or eighths. It's very handy to know the decimal equivalents of common fractions, so older children can estimate the fraction and then mentally divide it out to get percent, or start with the percent and reduce if necessary to get the proper fraction. (If you have them do this frequently, it may not be long before they have the equivalents memorized so they don't have to keep doing the mental math.) The next easy step is to move from percents to decimals.

Using proportions to estimate the sizes of huge objects is a great mental exercise for children. For example, if you want to estimate the height of a tree, you need to find a short object nearby. Then, measure the shadows of the tree and the shorter object and the height of the shorter object. (Again, your measurements can be standard units, or something physical like your hand or a stick.) Since the triangle formed by the short object and its shadow and the triangle formed by the big tree and its shadow are similar triangles, the ratio of the heights will be the same as the ratio of the shadows. If you divide the length of the tree's shadow by the length of the object's shadow, and multiply by the height of the object, you'll get the height of the tree. So as long as you can find a spot with good shadows, this will give a good estimate of the height of the tree.

You may have noticed that many of these mental word problems involve more than one concept and can easily be modified so children of different levels can take part in the problem solving. It is fun to work together to solve problems. As you develop the habit of observing math in nature and figuring out real-life math problems together, you'll be helping your children understand math better and develop strategies for solving written

word problems as well. Schools use word problems as a way to put math into real-life situations; as homeschoolers, we can teach math through practical, real-life situations, and we don't have to focus only on the pencil and paper methods of the classroom. Children often struggle with written word problems. By teaching math problems through real-life, so that solving them becomes as natural as speaking, you teach your children both to think and observe, and equip them with better tools to handle written word problems with ease.

Biographical Information

Carlita Boyles is a homeschooling mother of 3 children. She has an extensive background in public school education, particularly in the area of learning disabilities. She and her husband John have developed the new math curriculum, Math on the Level*, which takes advantage of the homeschool environment to teach math through life instead of through textbooks or workbooks. For more information, visit www.mathonthelevel.com.*