Teach & Kids Learn

Sixth Grade

In the 6th grade your child will continue to build on their reasoning skills by connecting ratios and rates to solve word problems. They will also be working with *variables* and variable expressions — the building blocks of algebra. Many of this year's topics will remain a major emphasis throughout the middle school years and into high school.

Skills Your Child Will Be Working On

- Understanding ratios and rates, and solving problems involving proportional relationships
- Dividing fractions and solving related word problems
- Using positive and negative numbers together to describe quantities; understanding the ordering and absolute values of positive and negative numbers
- Reasoning about relationships between shapes to determine area, surface area, and volume

- Working with *variables* and *expressions* by generalizing the way numbers work (e.g., when adding numbers, the order doesn't matter, so $x + y = y + x$; likewise, properties of addition and multiplication can be used to rewrite $24x + 18y$ as $6(4x + 3y)$, or $y + y + y$ as $3y$)
- Understanding the process of solving simple *equations*
- Writing *equations* to solve word problems and describe relationships between quantities

Learning Activity to Use at Home

Reasoning skills are made, not born! This activity uses estimation and the "Fermi Questioning" process. Enrico Fermi was a twentieth-century, Nobel Prize winning Physicist known for his ability to rapidly estimate calculations in his head. "Fermi Questions" emphasize determining an answer on the correct order of magnitude instead of a specific number. The goal of answering a "Fermi Question" is to make build a logical approach for providing a reasonable estimate to a given problem. For example:

1. Fermi Question – How many pet cats are there in the U.S.?
2. Fermi Solution – There are about 300 million U.S. citizens. Most households have more than one person, let's estimate 3 people/house or 100 million households in the U.S. I would guess 1 in 4 households have cats so about 25 million households have cats. Typically people have more than one cat, let's say 2, so there are about 25 million x 2 or 50 million pet cats in the U.S.
3. Explanation – Of course you may have chosen different numbers, but in the end the answer should be on the same order of magnitude (5,000 would be too low and 5 billion would be too high!).

Activity: Fermi Questions

What You Need:
  Pencil and paper (optional)

What You Do:
1. Try solving the following "Fermi Questions" with your child. Use paper and pencil only if necessary, but remember, everything should be estimated. Be sure to pick round numbers (1,000 not 1,170)!
    o   How many pizza restaurants are in your city?
    o   How many cars drive down your street in a day? Year?
    o   What is the total amount of time all the students in your school spend studying for tests in one year?
2. Have your child think up with some "Fermi Questions" and try to come up with a logical approach for estimating solving the
3. If possible, try looking up the actual answer to the questions (use the phone book or Internet) and see how close your child's answer is to the actual answer. Remember, you're looking for order of magnitude, not exact numbers!

The great thing about Fermi Questions is there are no right answers, only logical answers! By working through Fermi Questions, students develop logic and math skills without the fear of being "wrong."

Teacher and Parent Conferencing - Topics for ongoing conversations throughout the school year with your child's teacher.

When you talk to the teacher, do not worry about covering everything. Instead, keep the conversation focused on the most important topics. In sixth grade, these include:

- Is your child able to analyzing and solving word problems using *equations*?
- Is your child working with *variables* and *expressions?*

Ask to see a sample of your child's work. Ask the teacher questions such as: Is this piece of work satisfactory? How could it be better? Is my child on track? How can I help my child improve or excel in this area? If my child needs extra support or wants to learn more about a subject, are there resources to help his or her learning outside the classroom?