Common Core Math in 5th Grade

Fifth grade in the Common Core is the last year with arithmetic as a focus, though in later grades there will be plenty of opportunity to continue practicing these skills — for example, dividing numbers when computing proportions.

This year students will learn to add fractions with unlike denominators. This is a complicated process, and some curricula even suggest using elaborate gimmicks to remember it. In the Common Core approach, students will have a firm grounding in the number line, in renaming fractions ($\frac{2}{3}$ is also $\frac{4}{6}$), and in adding fractions with the same denominator ($\frac{3}{8}+\frac{2}{8}=\frac{5}{8}$). All of this will make addition of fractions a process that makes sense, rather than something to remember using tricks which use pictures of X's or butterfly wings.

This type of reasoning also helps to apply fraction arithmetic correctly. Many of us remember that you "multiply across" to multiply $\frac{2}{3}\times\frac{4}{5}$, but struggle to know if one *should* multiply in a real world context. A key is that $\frac{2}{3}\times\frac{4}{5}$ is what you get when you split $\frac{4}{5}$ of something into three equal pieces and take two of those. Students will use pictures to reason about problems, as many good problem-solvers often do. From these they will be able to know whether to multiply or divide, and have a sense for what they expect in a reasonable answer.

Students will use similar reasoning about whole numbers and decimals — using sketches, examples, and properties which have been carefully developed, so these arithmetic skills will provide a strong base for algebra.

Examples:

Video Game Scores (see reverse).
In this task, students connect a "real-life" situation to arithmetic with many steps. The students don't have to make calculations, though a teacher could ask them to if necessary. The more important part of the activity is to have students work on their mathematical language skills to interpret expressions in the context of the problem. This gives some great practice leading up to using variables as in algebra. One can just change the task a bit — an unknown amount of bonus points, for example — and it is a good algebra activity.

Tips for parents:

- It is likely that your child is learning in a way you didn't, so you can't just figure out in a minute what's going on. This presents a great opportunity: ask your child to explain some math to you! Communicating reasoning is a skill we want children to have, and it rarely happens enough.
- Children at this point will likely have a strong sense of how "good" they are at math, usually based on how quickly they can calculate. Challenge this! Many of the best mathematicians are slow at calculation, but take time to truly understand a problem. Understanding will eventually be a struggle for everyone in some math class. Just as a musician doesn't expect to play every new piece well, a math learner won't understand every concept right away but can progress until they get there.
- High achievers may be ready to use variables to more deeply reflect on the arithmetic they learn. If they see exactly why three fourths and one half makes five fourths (on the number line, especially), and similarly nine fourths and one half makes eleven fourths and so on, then they could also say that n fourths and one half makes $n + 2$ fourths. In symbols, that's $\frac{n}{4}+\frac{1}{2}=\frac{n}{4}+\frac{2}{4}=\frac{n+2}{4}$. This deeper reflection on fraction arithmetic is much more beneficial than rushing though the rules of arithmetic on an accelerated track.

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For further information see:
ime.math.arizona.edu/progressions
and illustrativemathematics.org

Example: Video Game Scores

https://www.illustrativemathematics.org/illustrations/590

Eric is playing a video game. At a certain point in the game, he has 31500 points. Then the following events happen, in order: He earns 2450 additional points. He loses 3310 points. The game ends, and his score doubles.

Write an expression for the number of points Eric has at the end of the game. Do not evaluate the expression. The expression should keep track of what happens in each step listed above.

Eric's sister Leila plays the same game. When she is finished playing, her score is given by the expression 3(24500+3610) – 6780. Describe a sequence of events that might have led to Leila earning this score.

Commentary:

Standard 5.OA.2 asks students to "Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them." This task asks students to exercise both of these complementary skills, writing an expression in part A and interpreting a given expression in part B. The numbers given in the problem are deliberately large and "ugly" to discourage students from calculating Eric's and Leila's scores. The focus of this problem is not on numerical answers, but instead on building and interpreting expressions that could be entered in a calculator or communicated to another student.

Solution:

a. When Eric earns 2450 additional points, his score becomes 31500 + 2450. When he loses 3310 points, his score becomes (31500 + 2450) – 3310. (Note that this can also be written without the parentheses.) When Eric's score doubles, the score becomes 2 x ((31500 + 2450) – 3310), which can also be written 2(31500 + 2450 – 3310).

b. Here is a possible sequence of events that might lead to the score given: At a certain point in the game, Leila has 24500 points. She earns 3610 additional points. Her score triples. She loses 6780 points.

c. Note that the order of the steps is important; rearranging the steps will likely lead to a different expression and a different final score.