A Note to Parents and Caregivers:

When you think of math class, there's a good chance you're thinking of a teacher lecturing, students copying down notes, and probably lots of practice problems. As long as you memorize the rules and follow the step-by-step instructions, you can get by.

But what if this experience of math class doesn't reflect the true work of doing mathematics? What if there was a more effective way to learn math?

In this course, we will be taking a different approach to learning math. It's called Experience First, Formalize Later (EFFL). With this approach, we will give students first-hand experiences discovering mathematical ideas for themselves, rather than telling students up front exactly what they have to know and asking them to memorize it. We will ask them to work with their peers on carefully designed activities that will allow them to use their own intuition, reasoning, and experiences to put together new ideas, by noticing patterns, adapting a strategy, making a prediction, or making use of a visual. Often, they'll do this within a familiar context, such as buying snacks at a gas station or looking at stats on a fitness tracker. Then we'll discuss their findings as a whole class, summarize key strategies, and layer on the formal vocabulary and notation that students are expected to know. The end result is that students are no longer watching someone else do the math, *they* are doing the math. This does not mean that the teacher will never provide information or assist students in developing and connecting ideas. The change is about *when* this occurs. While the teacher still plays a key role in helping students unpack the mathematics, they do this by way of discussion, and it occurs *after* students have had an opportunity to think through new problems on their own.

Why Teach and Learn in this Way?

The EFFL model is based on research about active learning–where students are the ones doing the thinking, reasoning, discussing, and problem solving. This approach has been shown to be more effective than passive learning, where students receive information from an expert and then are asked to repeat it. This is because being able to reproduce a set of steps to arrive at an answer is not the same as understanding it. In math class this year, we want to develop your student's ability to think critically, reason, and solve problems that are not identical to ones they have seen before. This is, in essence, true problem solving: being able to apply one's understanding to new problems, see connections between ideas, and use strategies you already know to tackle unfamiliar situations. There's one catch though.

Active learning doesn't always *feel* better than passive learning.

This conclusion was confirmed in a Harvard study in which two noteworthy findings emerged.

1. Students in an active learning environment showed better performance on assessments, compared to students in a passive learning environment.

2. Students in a passive learning environment *thought* they learned more than students in the active learning environment.

Why does this happen? Students feel comfortable listening to polished presentations from knowledgeable teachers. When what they're hearing makes sense to them, they think they have learned it, but they struggle to apply that knowledge to new situations. When students are asked to do the hard work of coming up with their own ideas and looking for strategies to solve a problem before they have been formally taught how to solve that problem, it can feel uncomfortable because their brain is being stretched. But that discomfort is exactly where deep learning happens!

What You Can Expect

As students are getting used to this new way of learning, you may hear some comments like "My teacher isn't teaching me" or "We had to figure it out ourselves" or "The teacher wouldn't give us the answer." In these situations, it is helpful to remember *why* we are asking students to learn this way. We want to build their reasoning skills, not just their ability to get a correct answer. We want them to develop, refine, and evaluate arguments, not solely rely on their teacher to tell them if something is right or wrong. To support your student you can ask questions like:

- What strategy could you use to figure this out?
- How is this connected to what you already know?
- What patterns do you notice?
- What have you tried so far?

It is important for students to realize that math isn't about being able to get answers quickly, but about explaining their reasoning, revising their thinking, and building on the ideas of others. We want them to be able to do more than just reproduce a procedure, and we want them to develop understanding that lasts beyond the next quiz or test. Math is not a fixed ability that students either have or don't have. It is something that can be developed over time, and our math classroom is striving to be the kind of environment where that growth is possible!