Conceptual Thinking
Procedural Fluency
Contextual Application

EDEN PRAIRIE SCHOOLS
Inspiring each student every day

Conceptual Thinking

"Rote memorization of mathematical procedures is insufficient for the demands of the 21st century. Students need to achieve a conceptual understanding of why and how mathematical principles work so they are able to explain their reasoning, defend their problem-solving approaches, create or describe visual models of mathematics, and retain their learning over time."

Procedural Fluency

"After reaching a conceptual level of understanding math, students need to be able to determine effective and efficient ways to express or perform mathematical processes and find solutions. As students become familiar with various mathematical procedures and algorithms, they are able to use them more easily and accurately."

Contextual Application

"A mathematical concept or procedure is not useful unless students recognize when and where to use it (as well as when and where it does *not* apply). In school, students are given specific problems to solve, but outside of school they encounter situations in which part of the difficulty is figuring out exactly what the problem is. Therefore, students need to be able to identify problems, devise solution strategies, and choose the most useful strategy for solving problems. They also need to be able to distinguish what is known and relevant from what is unknown."

<u>Example Questions:</u>

Why is $\frac{1}{6}$ greater than $\frac{1}{8}$? Draw a picture to prove this point.

Compare: $\frac{1}{3}$ _____ $\frac{1}{5}$

Jay ate $\frac{2}{3}$ of a cheese pizza. Chris ate $\frac{2}{5}$ of a pepperoni pizza. If the pizza pans are the same size, who ate the most total pizza?

Student Needs	Teacher Responsiveness
Students need more **CONCEPTUAL** opportunities.	*Have students create **visual models** of solutions *Have students **justify their answers** and why they make sense ***Remove numbers** from existing problems so students have to discuss the process without calculating an answer right away *Ask students to show **multiple methods** for achieving a solution
Students need more **PROCEDURAL** opportunities.	*Provide strategies for **checking one's work** so students can pre-emptively identify and correct computation errors *Utilize an **"I do, we do, you do"** approach to problem-solving *Engage students in **error analysis** to understand where and why computational mistakes were made *Provide brief, engaging, purposeful, and distributed **additional practice** to expand computational fluency
Student needs more **CONTEXTUAL** opportunities.	*Have students **write original word problems** from a specific mathematical expression or equation ("here's the equation - what's the story?") *Have students practice **translating word problems into equations** ("here's the story - what's the equation?") *Help students **retell word problems** in their own words *Expose students to a variety of **real-life examples** of a mathematical concept