

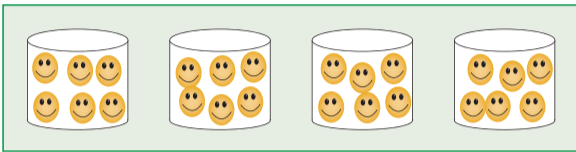
USING VISUAL REPRESENTATIONS

to Assist Elementary and Middle School Students Struggling with Math

Research shows that the use of visual representations may lead to positive gains in math achievement. Visual representations help students develop a deeper understanding of the problems they are working with, making them more effective problem solvers. Visual representations such as **manipulatives**, **number lines**, **pictorial representations**, and **strip diagrams** depicted in the IES Practice Guide, *Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools*, help scaffold learning and pave the way for understanding the abstract version of the representation.

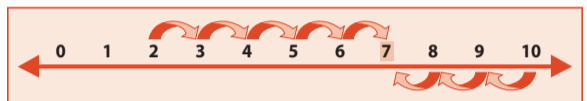
Manipulatives

Manipulatives can be utilized in lower grades in the initial stages of learning as teachers introduce basic concepts with whole numbers.



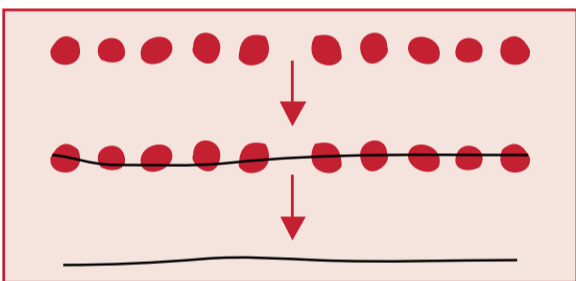
Number Lines

In early grades, number lines are often used to teach students foundational concepts of addition and subtraction. The goal of using a number line should be for students to create a mental number line and establish rules for movement along the line.



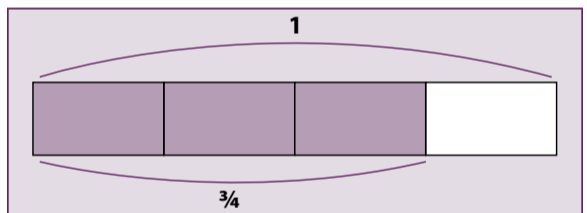
Pictorial Representations

Pictorial representations and simple drawings can help students understand place value and multi-digit addition and subtraction. In the figure, circles represent one unit and lines represent units of 10.



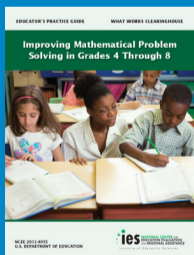
Strip Diagrams

Strip diagrams are drawings of narrow rectangles that show relationships among quantities. In upper grades, students can use strip diagrams to help them reason about and solve a wide variety of word problems about related quantities.

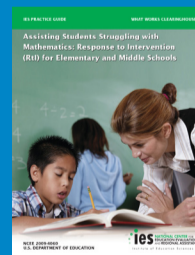


It is essential that teachers explain why the representation they are using is appropriate for the problem at hand. To help students learn how to employ visual representations, teachers can talk aloud about what they are thinking and the decisions they are making as they reason through a problem.

Additional Resources



Improving Mathematical Problem Solving in Grades 4 Through 8
<https://ies.ed.gov/ncee/wwc/PracticeGuide/16>



Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools
<https://ies.ed.gov/ncee/wwc/PracticeGuide/2>



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