Effective Mathematics Teaching Practices

Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

Implements tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students’ reasoning and sense making about important mathematical ideas and relationships.

Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.


www.nctm.org/principlestoactions
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Buckets of Buttons

Goals

• Sort, organize, and count objects.
• Use the Addition Principle of Counting to calculate totals.
• List possible categorizations for counting situations.
• Use a Venn Diagram to organize counting tasks.
You work for a sewing company that uses a variety of buttons, each distinguishable by:

- **size**,  
- **color**,  
- **shape**, and  
- the **number of holes** in the button.

In a recent shipment form a button company, all the buttons are shipped loosely to you, in one single container. Your job at the sewing company is to help sort the button shipment into different bins so that machine operators can efficiently find and use the type of button that they need.
Your group has a bucket of buttons—72 in all—and several bins. Arrange your bins in front of you in non-overlapping circles.

Now, sort those buttons into your bins.
• Indicate how you have sorted your buttons by creating a descriptive label for each of your bins.
  o Blue Buttons
  o Buttons with 2 holes
  o Round Buttons
  o Blue Buttons with 3 holes
• Count and record the number of buttons in each of your bins.

• How do these bin totals compare to the number of buttons you had at the start?
  - Addition Principle
  - Its Usefulness
Ms. H: How does the total number of buttons you had in your bucket compare to the total number of buttons in the bins you created?

Susie: We had 72 buttons in our bucket to start. In the end, we had 24 buttons in the “big buttons” bin, 24 in the “medium buttons” bin, and 24 in the “small buttons” bin.

Ms. H: And how does the total count of your buttons-in-bins compare to the number of buttons in the bucket at the start?

Susie: Well, 24 + 24 + 24 . . . hmm . . . that’s 72. Hey, that’s how many we started with!

Ms. H: And, for other groups that used different ways to make your bins? Do you agree?

Lisa: We had just two bins, one for “big blue buttons” and one for all the rest.

Ms. H: . . . and your counts?

Lisa: There are 8 buttons in the first bin and 64 in the other. Let’s see . . . 8 + 64 . . . 72 in all!

Ms. H: So, can someone tell everyone else what might be useful about sorting a big batch of buttons into bins?

Ron: Well, it helped us figure out how many buttons we had of the types we were interested in.

Stanislaus: And, it might be easier to count the buttons in each bin and add ’em up to confirm the overall total.
Activity GEMS for the PK-2 Classroom

and for...

Grades 3-5 (now available)

Grades 6-8 (to printer soon)

Grades 9-12 (writing now)