

Encouraging flexible subtraction reasoning

We offer suggestions that apply to classroom instruction related to subtraction. We present these in the form of things for teachers to notice, to use, and to encourage. We have tried or observed some of these in classrooms. Others are inspired by opportunities that we noticed in interviews.

Notice

- Notice the different situations in which you use subtraction and the ways that you reason about subtraction. (SMP 8: *Look for and express regularly in repeated reasoning.*)
- Notice the situations that your students associate with subtraction. (MTP7: *Elicit and use evidence of student thinking.*)
- Notice the language that you and your students use when talking about subtraction. (SMP 6: *Attend to precision.*)

Use

- Use the terms *minus* or *subtract* when reading the subtraction symbol, and refrain from reading the symbol as “*take away*” (Fuson 1986). (SMP 6: *Attend to precision.*)
- Use tasks such as $41 - 39 = \square$. Write these horizontally, rather than vertically, to encourage students to use nonstandard strategies. (MTP5: *Pose purposeful questions.*)
- Use story problems with Compare situations (Carpenter et al. 1999; CCSSI 2010) to emphasize thinking about differences as distances between numbers. (SMP 7: *Look for and make use of structure.*)
- Use think-alouds to model how you choose an approach to a subtraction problem in order to help students learn to articulate their reasoning

about subtraction. (MTP4: *Facilitate meaningful mathematical discourse.*)

- Use a number line posted on the wall of your classroom when discussing subtraction problems and strategies. Emphasize distances between numbers when this idea relates to a problem or strategy being discussed. (MTP3: *Use and connect mathematical representations.*)
- Use true/false equations, such as $72 - 68 = 74 - 70$, to support students in thinking about how adjusting both the minuend and the subtrahend by the same amount does not change the distance between the two values. (MTP2: *Implement tasks that promote reasoning and problem solving.*)

Encourage

- Encourage students to use mental math and to reason flexibly about subtraction. (MTP6: *Build procedural fluency from conceptual understanding.*)
- Encourage students to discuss and make sense of one another’s strategies. (SMP 3: *Construct viable arguments and critique the reasoning of others.* MTP4: *Facilitate meaningful mathematical discourse.*)
- Encourage students to ask specific questions, such as, “How were you thinking about subtraction?” or “Which meaning of subtraction were you using?” (MTP4: *Facilitate meaningful mathematical discourse.*)
- Encourage students to notice when a strategy is most helpful, depending on the numbers. (SMP 7: *Look for and make use of structure.*)
- Encourage students to describe what they are trying to find out when solving a subtraction problem. (SMP 6: *Attend to precision.*)