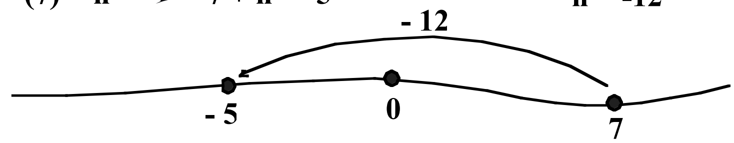
Numberlines

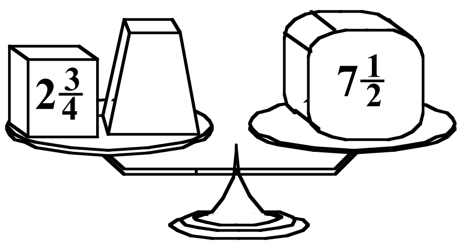
By thinking about subtraction on a numberline, students can develop important intuitions and powerfully efficient computational procedures. Integers are one of the most important topics in the middle grades and computation with integers is best approached meaningfully rather than by using a set of rules. Numberlines provide a natural way for students to learn how to add and subtract integers. In the example below, -5 – (7) is thought of as “What do I add to 7 to get -5?” By viewing the problem in this way, students can see that we have to go 12 units in a negative direction on the numberline to get to -5. Thus the result is -12.

Computation with integers is best approached meaningfully.

- 5 - (7) = n → 7 + n = -5 **n = -12**



Balances



Balances provide a meaningful visual setting for developing number relationships; they encourage powerful ways of thinking about number operations with rational numbers as well as whole numbers. In the example shown, the balance format suggests the question, “What must I add to 2 3/4 to get to 7 1/2?” So rather than trying to remember some poorly understood procedure, students can confidently reason to a solution.

Benchmarks

Using a benchmark approach to fractions, decimals, and percents, students can build up meaningful relationships in each of the three contexts. To begin a benchmark activity, students first fill in the table shown. Then they use selected benchmarks to determine new fractional amounts. For example, since one-third of 60 is 20, two-thirds of 60 is 40. Reasoning from benchmarks is very useful in mental arithmetic as well as estimation. Using benchmarks, students can develop a rich network of meaning for fractions and computation with fractions. By combining the benchmark approach to fractions, decimals and percents, it is possible to think of the three ways of writing numbers interchangeably; they become part of one global mental scheme and students are then able to move back and forth among the different symbolizations easily and meaningfully.

$\frac{2}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
60			

a) $\frac{2}{3}$ of **60** =

b) $\frac{3}{4}$ of **60** =