

Today's Number

1st grade

A first-grade class is told that today's number is 15. The students think quietly for a bit and then begin to share what they know about 15.

Alex comments, "I know that 15 is 5 more than 10."

"The speed limit in front of the school is 15," adds Max.

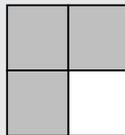
Lucy shares, "If you count by 5s, you'll get to 15."

5th grade

Down the hall, a class of fifth graders is thinking about $\frac{3}{4}$. The teacher asks students to talk with a partner and create a list of everything they know about $\frac{3}{4}$.

Partners Quintin and Carley's list includes the following:

- $\frac{3}{4}$ is a fraction.
- $\frac{3}{4}$ and 75% are equal.
- $\frac{3}{4}$ is more than $\frac{1}{2}$.



7th grade

In a seventh-grade classroom across town, students have been asked to suggest what they know about -8 .

Brian states, " -8 is the opposite of 8."

His teacher asks him to explain his thinking.

"Well, -8 and 8 are on different sides of 0, but they are the same number of spaces away from zero. It's kind of like symmetry," Brian responds.

Implementing the Routine

The Today's Number routine involves presenting a carefully selected “number of the day” to students. The students then generate a variety of representations of the number, including drawings, equations, and examples. Generating and sharing these representations allows students to grow in the ways they think about numbers and operations.

The number of the day may be presented to students in various ways. In the early elementary grades, the teacher may present the problem orally to the entire class and create a group list of representations as the students orally share. Figure 1.1 shows some of the ways a kindergarten class thought about the number 7. In later grades, Today's Number may be posted, projected, or simply distributed as the students enter the room. Older students may first create a list individually or in small groups. Working in small groups creates a level of confidence that will encourage students to more willingly share their representations. As students work, the teacher has the opportunity to listen to their discussions, to look at the representations being created, and to carefully choose and sequence representations to be shared that are most apt to benefit students' understanding. The discussions that occur as students share their representations are a valuable part of the growth that results from implementing this routine.

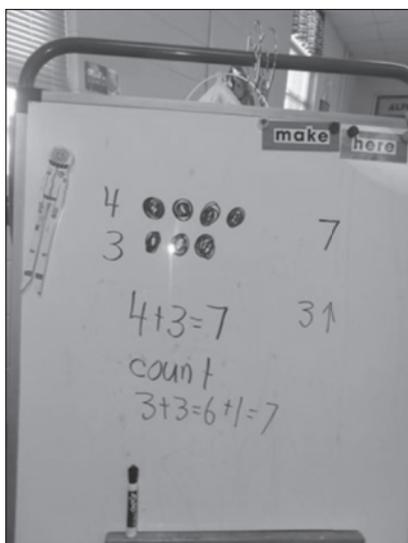


Fig. 1.1.

Kindergarten class representations of 7

Maintaining an ongoing record of student responses to Today's Number is another important part of the routine. Class charts may be created and posted so that students have a record of their thinking about a variety of numbers. Such a practice will allow the teacher to observe growth in student thinking as the year progresses. In addition, the teacher could compile the work generated by students to create a class book of Today's Number. Students may also record their representations of various numbers of the day in individual notebooks or journals. This, too, will provide ongoing evidence of growth in how students think about numbers and operations.

Mathematical Content and Practices

The Today's Number routine is easily implemented but can yield powerful results both in mathematical content and in mathematical practices. One benefit of the use of this routine is the growth in number sense it promotes. Shumway (2011) describes students with a sense of number as demonstrating a sense of what numbers mean, an ability to look at the world in terms of quantity and numbers, an ability to make comparisons among quantities, flexibility and fluidity with numbers, and an ability to perform mental math. The development of number sense should be considered at all grade levels. Reys and colleagues (2012) suggest that the development of number sense is a lifelong process and not an innate ability that students either have or do not have. Thus, number sense should not be viewed as a unit to be covered but rather as a daily thread that runs through all the mathematics work undertaken by students. The whole-number sense developed at the elementary level extends to number sense related to fractions, decimals, percent, integers, exponents, and roots in middle school. Number sense is further extended as high school students gain understanding of the real number system. Although the actual numbers used as Today's Number will change across grade levels, the consistent use of this routine throughout the grades will continue to enhance number sense.

The implementation of Today's Number—careful selection of a number, generation and recording of representations of the number, observation and discussion of representations of others, and response to teacher questioning—provides a structured way to enhance number sense. Two aspects of number sense encouraged by the use of Today's Number are the composition and decomposition of numbers and the use of part-whole relationships. In addition, students will gain valuable experience in generating equivalent expressions and creating new numerical expressions by modifying expressions suggested previously.

The Today's Number routine also allows students to develop the eight mathematical practices described in the Common Core State Standards for Mathematics (National Governors Association Center for Best Practices and Council of Chief State School Officers 2010; see appendix A). One practice involves the construction of viable arguments and the critique of the reasoning of others. Explaining their thinking is not an easy task for students working at any level. In fact, many mathematically proficient and gifted students have a great deal of difficulty explaining how they arrived at an answer. The open-ended nature of the Today's Number task allows for responses at multiple levels of thinking and gives students the opportunity to explain their thinking. Students also have the opportunity to informally critique the justifications provided by others as they hear other students explain their own representations. Another mathematical practice enhanced by the use of Today's Number is making use of the structure of mathematics. Many students will provide representations of the number of the day that are based on the decomposition of the number. As they decompose a variety of numbers, patterns will emerge. For example, when thinking about the number 48, a student may first suggest that 48 could be presented as 6×8 . Another student may use this fact to suggest thinking about 6×8 as $6 \times 5 + 6 \times 3$. Such representations suggested over time for a variety of numbers will result in a foundation for learning about the distributive property.

A variety of models may be used across grade levels with Today's Number, and the consistent use of these models will provide curricular articulation and coherence. Bar, part-whole, number bond, and number line models may each be used at any grade level. Bar, part-whole, and number bond models may be used to illustrate decomposition, and the number line model used to represent the comparison of the number of the day to other numbers. Figure 1.2 shows the use of these models for a variety of Today's Numbers. Teachers should look for and capitalize on student use of these models when selecting sample representations to be shared with the class. If these models are not suggested by students, the teacher may choose to introduce them as a way to represent Today's Number. In the student work we collected, students often used the number line model, but few used the other models without teacher prompting.

Assessing Student Thinking

numbers. Some individual think time followed by the opportunity to share in small groups before sharing with the whole class will promote a classroom

Allowing students to share their representations and learn from each other is a vital component of Today's Number and provides the teacher with a great deal of information about how students are thinking about

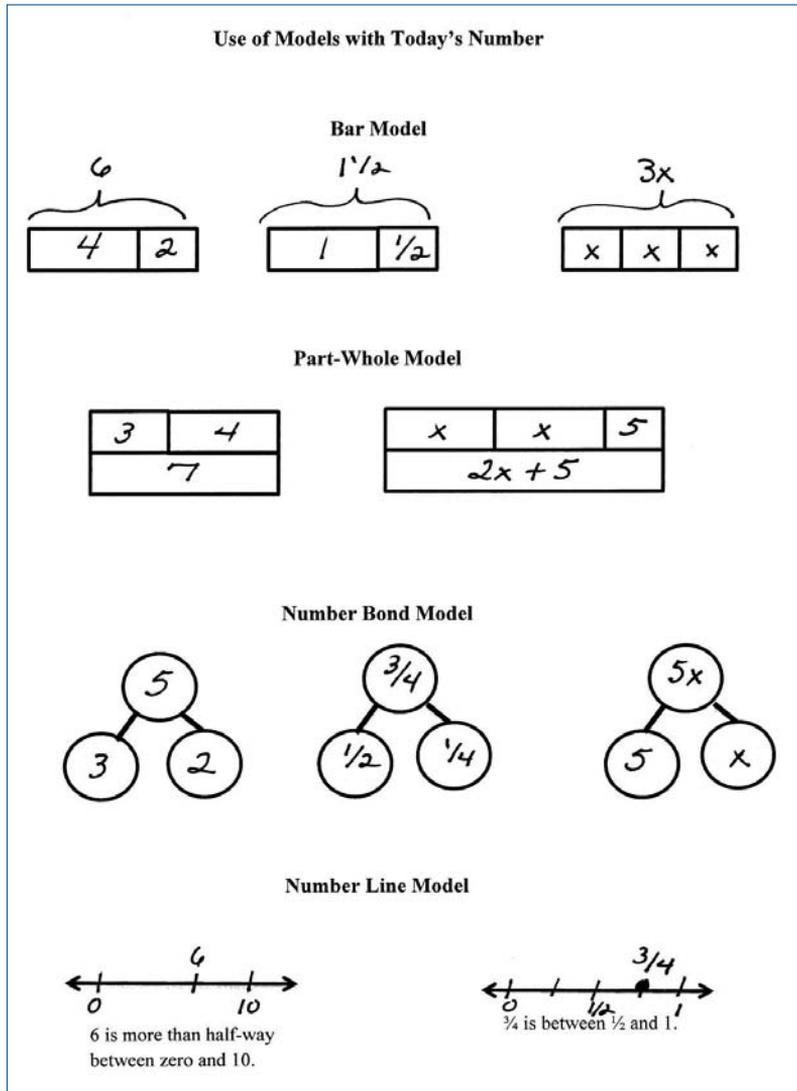


Fig. 1.2.
Use of models with Today's Number

environment that validates the importance of the thinking of all students and the importance of communication in mathematics. Shumway (2011) suggests that for teachers the difficult part of this routine is knowing what to look for in student work and how to highlight important math concepts as the students share their representations. She provides a list of common big ideas to look for in student work, including decomposing the number; using various groupings of ones, tens,

High-Yield Routines

hundreds, and thousands; using a pattern; looking at numbers in interesting ways; and using a variety of ways of thinking about numbers.

In examining student work collected across grade levels, we noticed four consistent types of representations being used by students:

1. Composing/decomposing
2. Representing relationships to other numbers
3. Representing mathematics in the world
4. Using models

Figures 1.3–1.6 show examples of each of these common representations at various grade levels. Although no type is more important than another, teachers should recognize and have students share examples of each type.

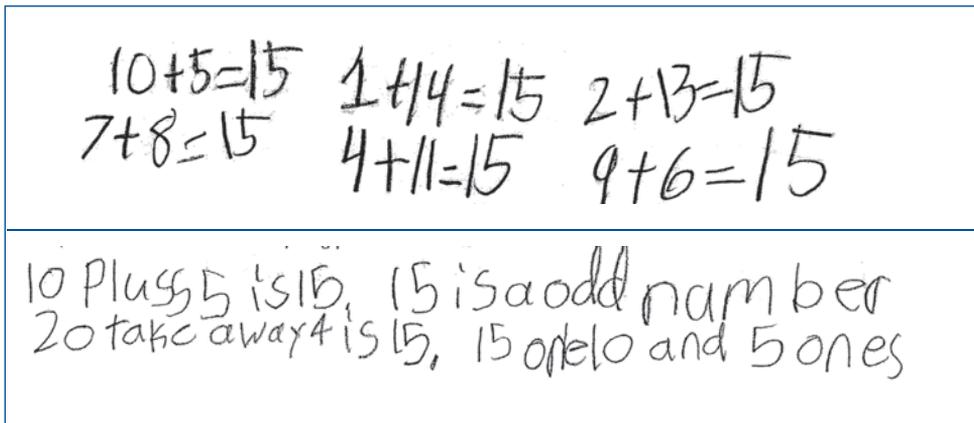


Fig. 1.3a and 1.3b.

Second graders use decomposition to represent 15.

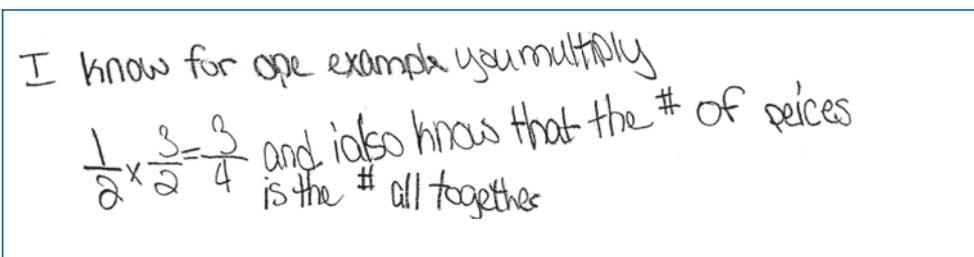


Fig. 1.3c.

A fifth grader represents $\frac{3}{4}$ by using decomposition.