Teacher Note

Division Notation

When solving division problems, students often use words to explain their thinking, as this student does for 374 ÷ 12.

"I start with 12 × 10 which equals 120. Then I triple 120 which is 360. So that's thirty 12s in 360. I have 14 left. There is one 12 in 14 with 2 left over. Then I add 30 + 1 to get thirty-one 12s and I still have the 2 left over, so my answer is 31 remainder 2."

Although this thinking is easy to follow, writing solutions in this way is not efficient in the long run. As students explain their strategies for solving a problem, model how to write the steps of their problem-solving process with equations. Recording in this way helps students keep track of their process, facilitates comparison of strategies, and provides examples of ways in which students can record strategies themselves. The convention for recording the remainder with a capital "R" is used in these materials: 374 ÷ 12 = 31 R2.

In order to help the class follow a student's strategy, you may need to record all of the steps in the student's procedure. For the student's explanation given above, for example, you might record the following:

$$10 \times 12 = 120$$
$$10 \times 12 = 120$$
$$10 \times 12 = 120$$

$$30 \times 12 = 360$$

$$374 - 360 = 14$$

$$\begin{array}{r} 30 \times 12 = 360 \\ \underline{1 \times 12 = 12} \\ 31 \times 12 = 372 \end{array}$$

$$374 \div 12 = 31 \text{ R2}$$

You need to decide the importance of asking the student to record every step in different situations. Writing down every step can be cumbersome, but may be necessary when strategies are being shared with other students. You might choose to supply some of the missing steps after hearing students' oral explanations.

At other times, when you are helping the class or individual students summarize their solution strategy, encourage them to use more compact notation that shows the essence of their approach. Here are two more concise notations for this solution:

374 ÷ 12		374 ÷ 12
120	10 × 12	30 × 12 = 360
360	30 × 12	1 × 12 = 12
372	31 × 12	31 × 12 = 372
374 ÷ 12 = 31 R2		374 ÷ 12 = 31 R2

In these summaries, some of the steps that were done mentally, such as 374 − 372, are not recorded, but we can easily follow the student's thinking. Remind students to make clear what the answer to the problem is, because the answer may be embedded in the computation steps.

Here are several other examples of clear notations that are often used by students:

374 ÷ 12
120 ÷ 12 = 10
120 ÷ 12 = 10
120 ÷ 12 = 10
360 ÷ 12 = 30

374 ÷ 12 = 31 R2

374 ÷ 12
10 × 12 = 120
20 × 12 = 240
30 × 12 = 360
~~40 × 12 = 480~~
31 × 12 = 372

374 ÷ 12 = 31 R2

374 ÷ 12

120	10
240	20
360	30
12	1
372	31

374 ÷ 12 = 31 R2

Using a table helps some students organize their work.

374 ÷ 12

	× 12
10	120
10	120
20	240
10	120
30	360
1	12
31	372
374 ÷ 12 = 31 R2	

Consider if, when, and how to introduce these notations (or others your students devise) to your students. Students need not learn many different notations. What is expected is that students learn to clearly and unambiguously notate their solutions so that they can keep track of the work and know when they have completed the problem, and so that anyone looking at the work can understand their reasoning.