Long Division

Short description: Learn how to use long division to divide large numbers in this Math Shorts video.

Long description: In this video, learn how to use long division to divide large numbers. In the accompanying classroom activity, students learn how to use the standard long division algorithm. They explore alternative ways of thinking about long division by using place value to decompose three-digit numbers into hundreds, tens, and ones, creating three smaller (and less complex) division problems. Students then use these different solution methods in a short partner game.

Activity Text

Learning Outcomes
Students will be able to

- use multiple methods to solve a long division problem

Common Core State Standards: 6.NS.B.2

Vocabulary: Division, algorithm, quotients, decompose, place value, dividend, divisor

Materials: Number cubes

Procedure

1. Introduction (10 minutes, whole group)
Begin class by posing the *division* problem 245 ÷ 5. But instead of showing students the standard long division *algorithm*, rewrite 245 as 200 + 40 + 5 and have students try to solve each of the simpler problems 200 ÷ 5, 40 ÷ 5, and 5 ÷ 5. Record the different *quotients* as students solve the problems. Show them that the quotients 40, 8, and 1 add up to 49—and that 49 is also the quotient of 245 ÷ 5. Learning to *decompose* numbers by using *place value* concepts is an important piece of thinking flexibly about the four basic operations.

Repeat this type of logic with the problem that students will see in the video: 283 ÷ 3. Use the concept of place value to rewrite 283 as 200 + 80 + 3 and have students try to solve the simpler problems 200 ÷ 3, 80 ÷ 3, and 3 ÷ 3. Record the different quotients as students solve the problems. Then, add all the quotients together to find that 283 ÷ 3 = 94 R1. Ask students, How is the idea of a “remainder” different when you solve the simpler problems?

Now, show the regular long division algorithm (as shown later in the video). Ask students to compare the two methods. How does breaking the *dividend* into hundreds, tens, and ones help them make sense of the long division algorithm? Do

they prefer to solve long division problems using the algorithm, or by using more informal methods?

2. Watch and Discuss the Video (10 minutes, pairs)
Have students watch the video in pairs. Discuss the following questions as they watch:

- What are the steps in the standard long division algorithm?
- What does a remainder indicate?
- Describe an alternative way to solve the problem 283 ÷ 3.

3. Activity (15 minutes, pairs)
Students play a game where they generate random division problems for each other by rolling a number cube. The first number rolled is the *divisor*, and the next numbers are the dividend. For example, rolls of 3, 6, and 1 can be written as 61 ÷ 3. (To make longer problems, just increase the number of rolls.) After one student creates the division problem, the other student should solve it using either the standard algorithm or an invented method. The student who created the problem should also check the other student's answer. As students play the game, they should record their work.

Students can create problems in increasingly difficult levels:

1. Double-digit number divided by a single-digit number (3 rolls total)
2. Triple-digit number divided by a single-digit number (4 rolls total)
3. Triple-digit number divided by a double-digit number (5 rolls total)

After playing the game for 10 minutes, each student should roll the number cube four times and create a new division problem for him/herself. The student should solve it in two ways: using the standard algorithm and also using a nonstandard method (such as the method described during the introduction). In addition to showing the calculations, the student should also use words to describe the solution method, as though he/she were describing it to a younger student.

4. Conclusion (5 minutes, whole group)
Review the standard algorithm one more time and ask students what other methods they used to solve the division problems. Take a few minutes and solve some of the problems together.