Size of Divisor and Size of Quotient

Let's explore quotients of different sizes.

1.1 Math Talk: Size of Dividend and Divisor

Find the value of each expression mentally.

- $5{,}000 \div 5$
- $5{,}000 \div 2{,}500$
- $5{,}000 \div 10{,}000$
- $5{,}000 \div 500{,}000$

1.2 All Stacked Up

1. Here are several types of objects. For each type of object, estimate how many are in a stack that is 5 feet high. Be prepared to explain your reasoning.

   Cardboard boxes

   Notebooks

   Egg cartons

   Coins

2. A stack of books is 72 inches tall. Each book is 2 inches thick. Which expression tells us how many books are in the stack? Be prepared to explain your reasoning.

   - $72 \cdot 2$
   - $72 - 2$
   - $2 \div 72$
   - $72 \div 2$

1.3 All in Order

Your teacher will give you two sets of papers with division expressions.

1. Without computing, estimate the quotients in each set and order them from greatest to least. Be prepared to explain your reasoning.

   Pause here for a discussion.

   Record the expressions in each set in order from the greatest value to the least.

   a. Set 1

   b. Set 2

2. Without computing, estimate the quotients and sort them into the following three groups. Be prepared to explain your reasoning.

$30 \div \frac{1}{2}$	$9 \div 10$	$18 \div 19$	$15{,}000 \div 1{,}500{,}000$
$30 \div 0.45$	$9 \div 10{,}000$	$18 \div 0.18$	$15{,}000 \div 14{,}500$

- Close to 0
- Close to 1
- Much larger than 1

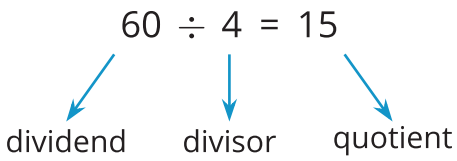
Are you ready for more?

Write 10 expressions of the form $12 \div ?$ in a list ordered from least to greatest. Can you list expressions that have value near 1 without equaling 1? How close can you get to the value 1?

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

Lesson 1 Summary

Here is a division equation: $60 \div 4 = 15$. In this equation, we call 60 the *dividend* and 4 the *divisor*. We call the result of the division, 15, the *quotient*.



We don't always have to make calculations to have a sense of what a quotient will be. We can reason about it by looking at the size of the dividend and the divisor. Let's look at some examples.

$20 \div 9$	The divisor, 9, is very close to 10. We know that $20 \div 10$ is 2, so $20 \div 9$ is a little more than 2.
$99 \div 101$	The dividend, 99, is very close to 101. Because $101 \div 101$ is 1, $99 \div 101$ is a little less than 1.
$5 \div 98$	The divisor, 98, is very close to 100. We know that $5 \div 100$ is $\frac{5}{100}$ or 0.05, so $5 \div 98$ is around 0.05.

In general:

- When a larger number is divided by a smaller number, such as $20 \div 9$ or $86 \div 80$, the quotient is greater than 1.
- When we divide two numbers that are nearly equal to each other, such as $99 \div 101$ or $75 \div 74$, the quotient is close to 1.
- When a smaller number is divided by a larger number, such as $5 \div 98$ or $27 \div 300$, the quotient is less than 1.