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Unit 4, Lesson 1: Size of Divisor and Size of Quotient

Let's explore quotients of different sizes.

1.1: Number 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.

   a. Cardboard boxes

   

   c. Notebooks

   

   b. Bricks

   

   d. 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.

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a. $72 \cdot 2$ b. $72 - 2$ c. $2 \div 72$ d. $72 \div 2$

3. Another stack of books is 43 inches tall. Each book is $\frac{1}{2}$-inch thick. Write an expression that represents the number of books in the stack.

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1.3: All in Order

1. Your teacher will give your group two sets of division expressions. Without computing, estimate their values and arrange each set of expressions in order, from largest to smallest. Be prepared to explain your reasoning. When finished, pause for a class discussion.

2. Record the expressions in each set in order from largest to smallest.

   Set 1

   Set 2

3. Without computing, estimate each quotient and arrange them in three groups: close to 0, close to 1, and much larger than 1. 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

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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?

Lesson 1 Summary

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

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.

- In $100 \div 11$ and in $18 \div 2.9$ the dividend is larger than the divisor. $100 \div 11$ is very close to $99 \div 11$, which is 9. The quotient $18 \div 2.9$ is close to $18 \div 3$ or 6.

  In general, when a larger number is divided by a smaller number, the quotient is greater than 1.

- In $99 \div 101$ and in $7.5 \div 7.4$ the dividend and divisor are very close to each other. $99 \div 101$ is very close to $99 \div 100$, which is $\frac{99}{100}$ or 0.99. The quotient $7.5 \div 7.4$ is close to $7.5 \div 7.5$, which is 1.

  In general, when we divide two numbers that are nearly equal to each other, the quotient is close to 1.

- In $10 \div 101$ and in $50 \div 198$ the dividend is smaller than the divisor. $10 \div 101$ is very close to $10 \div 100$, which is $\frac{10}{100}$ or 0.1. The division $50 \div 198$ is close to $50 \div 200$, which is $\frac{1}{4}$ or 0.25.

  In general, when a smaller number is divided by a larger number, the quotient is less than 1.

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Unit 4, Lesson 1: Size of Divisor and Size of Quotient

1. Order from smallest to largest:

   - Number of pennies in a stack that is 1 ft high
   - Number of books in a stack that is 1 ft high
   - Number of dollar bills in a stack that is 1 ft high
   - Number of slices of bread in a stack that is 1 ft high

2. Use each of the numbers 4, 40, and 4000 once to make true statements.

   a. The value of _____ $\div 40.01$ is close to 1

   b. The value of _____ $\div 40.01$ is much less than 1.

   c. The value of _____ $\div 40.01$ is much greater than 1.

3. Without computing, decide whether the value of each expression is much smaller than 1, close to 1, or much greater than 1.

   a. $100 \div \frac{1}{1000}$

   b. $50\frac{1}{3} \div 50\frac{1}{4}$

   c. $4.7 \div 5.2$

   d. $2 \div 7335$

   e. $2{,}000{,}001 \div 9$

   f. $0.002 \div 2{,}000$

4. A rocking horse has a weight limit of 60 pounds.

   a. What percentage of the weight limit is 33 pounds?

   b. What percentage of the weight limit is 114 pounds?

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c. What weight is 95% of the limit?

(from Unit 3, Lesson 16)

5. Compare using $>$, $=$, or $<$.

a. 0.7 _____ 0.70

b. $0.03 + \frac{6}{10}$ _____ $0.30 + \frac{6}{100}$

c. 0.9 _____ 0.12

(from Unit 3, Lesson 15)

6. Diego has 90 songs on his playlist. How many songs are there for each genre?

a. 40% rock

b. 10% country

c. 30% hip-hop

d. The rest is electronica

(from Unit 3, Lesson 14)

7. A garden hose emits 9 quarts of water in 6 seconds. At this rate:

a. How long will it take the hose to emit 12 quarts?

b. How much water does the hose emit in 10 seconds?

(from Unit 3, Lesson 8)