



Try these activities with students who are working in *Gamma* through *Zeta*.

## Zero and Measurement

### Extend the concept of nothing to weights and measures around your home.

Some suggested items for this activity include a ruler, yardstick or tape measure, rain gauge, and food scale.

**On the ruler**, show your child the left-hand side with the first inch. Explain that the starting point is zero (which may or may not be marked with the symbol 0). Invite your student to measure an object with the ruler, such as the edge of a table, a pencil, or a piece of paper. Talk about how the measurement would change if he didn't start the measure at zero.

**If you have a rain gauge**, pour in a little water and ask your child how much rain the amount would represent. Next, have your child pour out the water and ask what the zero means on the gauge.

**If you have a food scale available**, ask your child to point out the starting point of the scale and listen to see if he uses the word zero to describe it. Next, weigh a piece of fruit such as an apple, orange, or a banana. Read the weight with your child, such as 4 ounces. Next, ask your child, "What will the weight be if we take off the fruit?" Expect answers such as "nothing" or "no ounces". Encourage him to use the word zero to describe the weight.

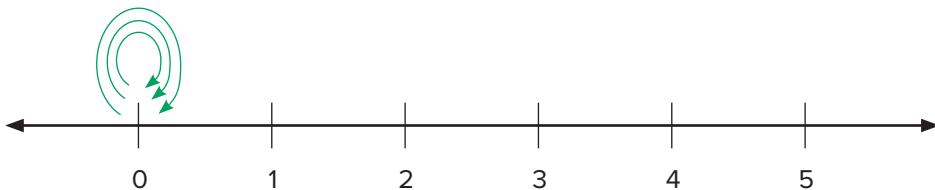
## Multiplying by Zero

In Math-U-See® your student is taught that multiplication by zero means zero counted a specified number of times. For example,  $0 \times 3$  is zero counted three times, or  $0 + 0 + 0$ , which equals zero. If your student still struggles to understand the abstract concept of multiplication by zero, a number line may help.

To multiply on the number line, start at 0 and count by the first factor in the problem as many times as indicated by the second factor.

### Example A

Begin at zero. Count by zero three times. The result is zero.



### Example B

Begin at zero. Count by threes zero times. The result is zero.

Counting by threes zero times is the same as not counting by threes at all. Thus, the result is zero.





### Does Zero Have a Reciprocal?

Remember that you can think of a whole number as being “number/1”, such as 2 or  $\frac{2}{1}$ .

To find the reciprocal, you “flip it over,” which is the same as dividing 1 by the number.

Therefore, the reciprocal of 2 is  $\frac{1}{2}$ .

**Fill in the chart to find the reciprocal for the numbers that are given.** The first two have been done for you.

Number	Reciprocal
5 or $\frac{5}{1}$	$\frac{1}{5}$
28 or $\frac{28}{1}$	$\frac{1}{28}$

Number	Reciprocal
1,000 or $\frac{1,000}{1}$	
8 or	
25 or	

When you multiply a number by its reciprocal, the result is 1. This is also known as the *multiplicative inverse*.

**Multiply each number by its reciprocal to illustrate this concept.** The first two have been done for you.

Number multiplied by its reciprocal	Result
$5 \times \frac{1}{5}$	1
$28 \times \frac{1}{28}$	1

Number multiplied by its reciprocal	Result
$1,000 \times$	
$8 \times$	
$25 \times$	

What happens when you multiply zero by its reciprocal? Is the result equal to 1?

**Multiply zero by its reciprocal. Write your answer in the chart.**

Number multiplied by its reciprocal	Result
$0 \times \frac{1}{0}$	

Zero times anything is always zero. Since the result is not 1, the number zero does not have a reciprocal that meets the requirements of the multiplicative inverse. As you continue your math studies, you will learn more about the unique qualities of zero and division by zero.

### Zero in its Place

Ask your student to use zero and two other numbers of his choice from 1–9 to complete the activities listed below. After each activity discuss with your student the place value of the digit zero in each number and how it affects the overall value of each number.

#### Example: 0, 6, 9

1. Create the greatest number from the three digits. 960
2. Create the least number from the three digits. 069
3. How many other numbers can you create? 609, 690, 096, 906
4. Use the greatest number and count backward by tens. 960, 950, 940, 930...
5. Use the least number and multiply by tens. 69, 690, 6,900, 69,000...
6. Use the greatest number and divide it by tens. 960, 96, 9.6, 0.96...

*Note: This activity can be extended by creating four- or five-digit numbers.*