

Why Can't We Divide By Zero?

Division by zero is said to be *undefined*, for example,

$$\frac{12}{0} = \text{Undefined}$$

To understand why division by zero is undefined, we have to look at the inverse operation of division: multiplication.

To explain, let's consider a simple division exercise:

$$\frac{12}{4} = 3$$

Since 12 divided by 4 is equal to 3, 3 multiplied by 4 must equal 12 (since division and multiplication are inverse operations):

$$3 \times 4 = 12$$

Let's assume that we can divide by zero so that 12 divided by zero is some real number, which we'll call "?":

$$\frac{12}{0} = ?$$

Whatever number "?" is, "?" multiplied by 0 must equal 12 (since division and multiplication are inverse operations):

$$? \times 0 = 12$$

But we know that any number multiplied by zero must equal zero:

$$? \times 0 = 0$$

This is a contradiction: $? \times 0$ can't be equal to both 12 and 0. This means our assumption that we can divide 12 (or any number) by zero must be a false assumption. Therefore, division by zero is undefined.